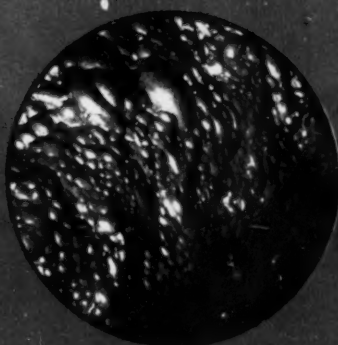


MINING WORLD



in this issue

Fine Milling at the Iron King

Page 26

IN FRANCE,
as elsewhere throughout the world, they use
good dependable Eimco loaders. They know
from experience that successful tunnel driving
requires starting with the right equipment.
Here an Eimco Model 21 is cleaning up portal
area before going underground.

EIMCO
THE EIMCO CORPORATION

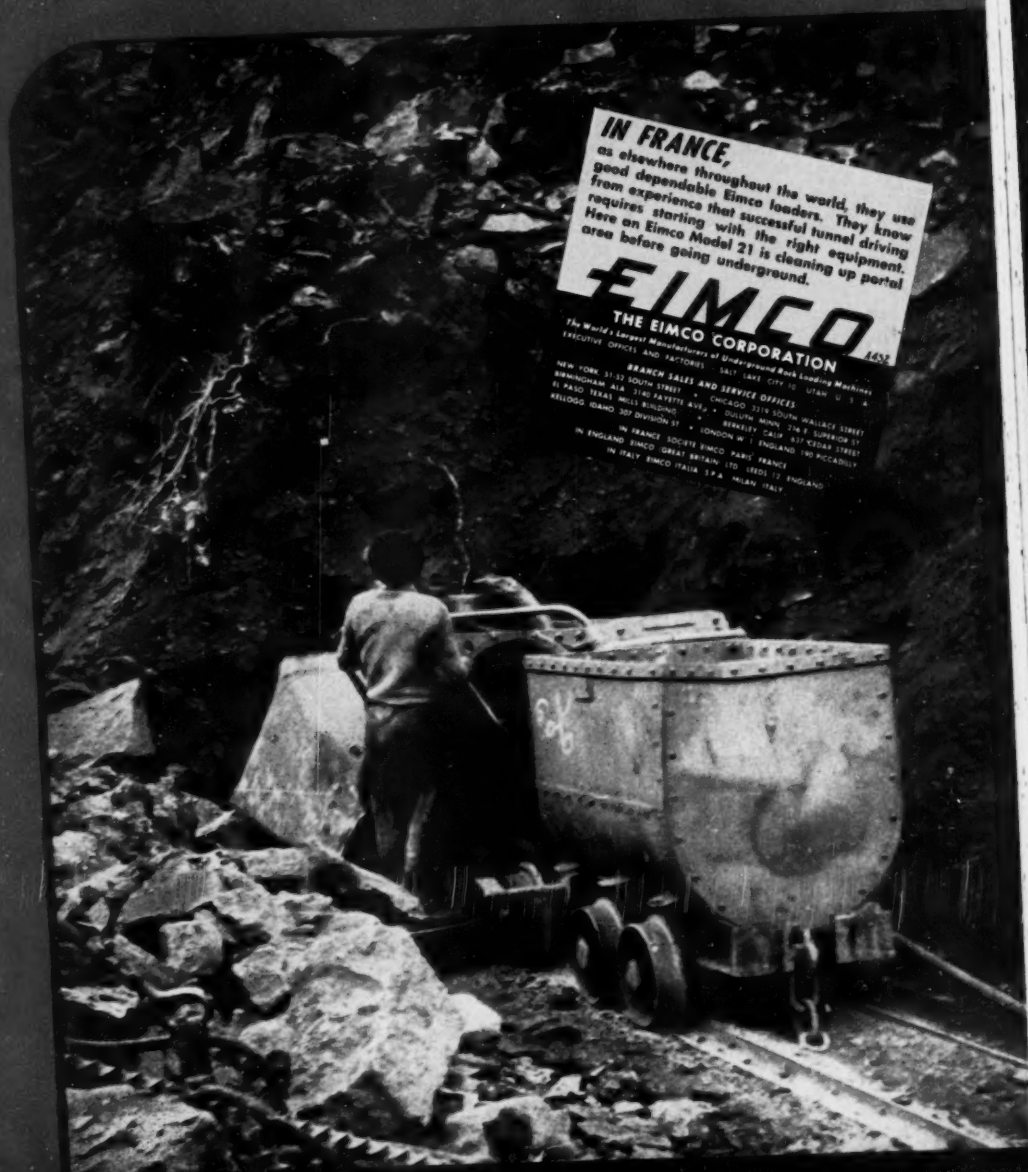
The World's Largest Manufacturers of Underground Rock Loading Machines
EXECUTIVE OFFICES AND FACTORIES: SALT LAKE CITY, UTAH, U.S.A.

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FEBRUARY, 1953

Vol. 15 No. 2

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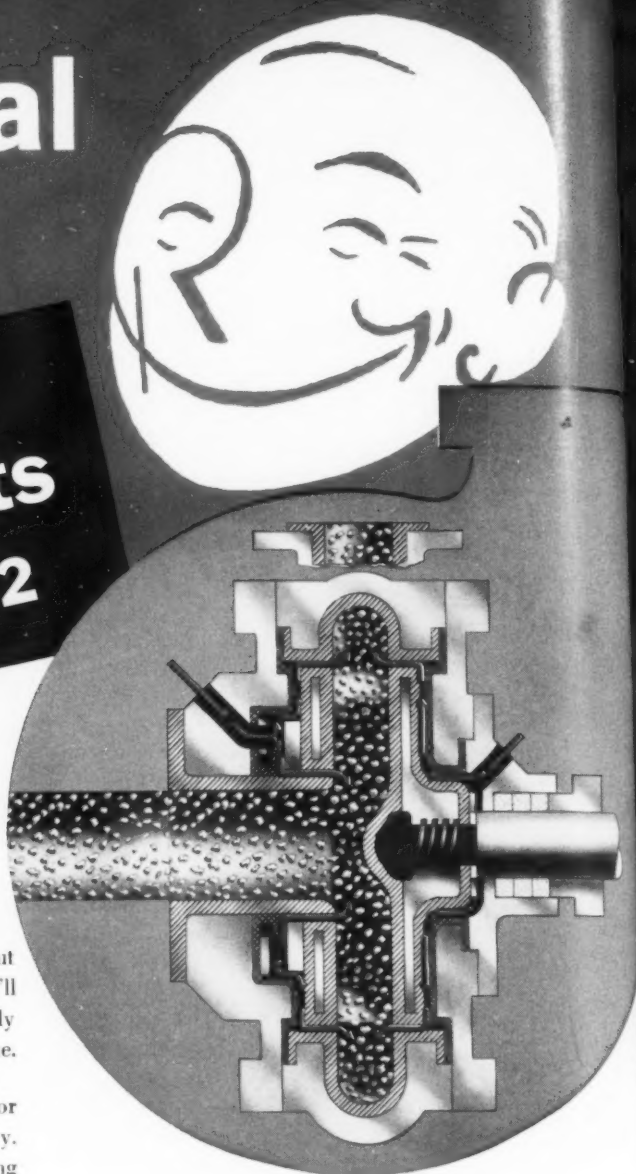
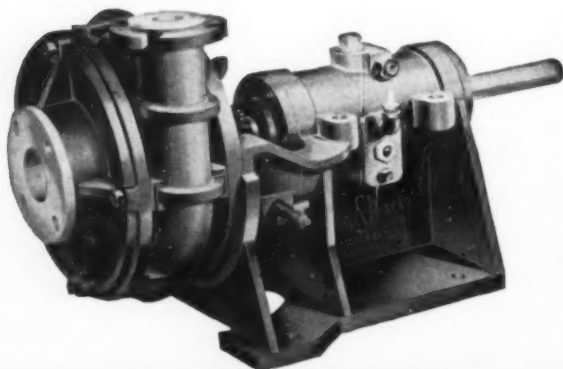


Hydroseal pumps

reduce
power costs
by $\frac{1}{3}$ to $\frac{1}{2}$

One of the features that users like best about Hydroseals is the way they save power. You'll like this feature, too, because it generally pays for the pumps in a short period of time.

Here's why Hydroseals cost less to run. For one thing, they have high initial efficiency. Clear, non-abrasive liquid is always flowing in the directions shown by the arrows, preventing abrasives from entering the clearances between the impeller and side plates. There's no "double pumping" of abrasives and—no enlarging of critical clearances. This



protection insures steady, high-level performance, with substantially constant power consumption for the life of the pump. You don't need to get oversize pumps and motors to allow for wear-in . . . Hydroseals will fit from the start, and save you power as you go.

If you're pumping abrasives, it will pay you to learn more about Hydroseal advantages. Write today for our latest catalog.

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SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTS

DW10 for deep down



DEPENDABILITY

In mining, like any other business, speed means money. That's why a tough, tireless Caterpillar DW10 speeds a W10 Wagon along the rough underground roads of the Netta Mine, operated by Eagle-Picher Co. in Cardin, Okla.

Three times each hour, this swift team lugs 15 tons of lead and zinc ore over a haul distance of $3\frac{1}{2}$ miles! Every hour 45 tons of ore are delivered to the shaft where it is hauled to the surface.

At the drilling area, a busy Caterpillar HT4 Shovel fills the wagon's yawning, big-capacity bowl.

Under rugged conditions, this rough-and-ready big yellow team produces for Eagle-Picher Co. It's expected to. Tractors, wagons, and shovel are all Caterpillar-built—every part designed for rough work. Cat Diesel Tractors never sputter and die with heavy loads in rough going because

tenacious lugging characteristics are engineered and built into them.

This equipment is built to work long and hard. You can keep it up to Cat standards by insisting on genuine Caterpillar parts. The nearby Caterpillar Dealer who sells you the equipment will give you quick, expert service.

CATERPILLAR, SAN LEANDRO, CALIF.; PEORIA, ILL.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT



"Bedeviled Copper" helps to build a battleship

• The hard, ductile, malleable metal known as NICKEL derives its name from "kupfer-nickel", meaning *bedeviled copper*, a name given it by superstitious medieval Saxon miners. These miners, in uncovering what appeared to be a fresh lode of silver ore, thought the devil of the earth, "Old Nick", had cast a spell over their ore since it could not be hammered into useful articles . . . and it was several hundreds of years later that Cronstedt's discovery led to the actual recognition of nickel.

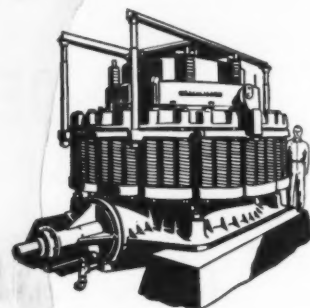
Among the thousands of ways in which nickel now serves man is in the construction of a modern battleship—where this versatile corrosion-resistant metal is used in armor plate, gun tubes, and scores of other ordnance, navigational and communications material.

From the opening of the first Sudbury mine in 1886, the history of nickel is largely that of International Nickel Company, who today produce fully 75% of the world's total nickel output. Playing an important role in International Nickel Company's production are twenty SYMONS Cone Crushers . . . which are recognized throughout the world for their ability to efficiently produce a great quantity of finely crushed product at low cost.

Thus, through the 20 SYMONS Cone Crushers at "Inco" mines passes the majority of nickel used today . . . one more example of a job well done by SYMONS Cones.

NORDBERG MFG. CO., Milwaukee, Wisconsin

C652



• SYMONS Cone Crushers . . . the machines that revolutionized crushing practice . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.

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MINING WORLD

Including the Export Edition WORLD MINING

Published monthly except in April when publication is semi-monthly

VOLUME 15

FEBRUARY 1953

NUMBER 2

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THE COVER CIRCLE: Froth from lead cleaners at Shattuck Denn's Iron King mill near Humboldt, Arizona carries the first of the three concentrates produced—lead, zinc, and an iron product that carries gold and silver. The hard, abrasive, fine-grained Iron King ore makes milling a difficult problem is cost and quality control.

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GRAB SAMPLES From the Mail

Pumping or Displacing?

Dear Sir:

We have read your article in the November issue, pages 30 and 31, "Concreting at Mather 'B' Mine" and would like to have 1,500 or 2,000 reprints for our pamphlet on tunnel lining which is gradually being asked for by engineers from all over the world who find therein information on up-to-date tunnel construction.

Your article is very good. One may object to your calling Press-Weld placer a pump and having it pump. It does not pump but forces concrete through by means of air pressure which technically is not pumping, but this is of no consequence anyway.

Charles Bryant
Pressed and Welded
Products Company

Akjouit Metallurgy a Problem

Dear Sir:

It is always with great pleasure that I receive the successive issues of World Mining and with much interest that I find there a consistent documentation of facts.

In the October 1952 issue I have read "Miami Block Caving Development," "Improved Sintering at Benson," then "Diesel Engines (on Euclid trucks) Started by Air Motors," and a report and photograph "Fluosolids at Kosaka" which confirms to me the possibility of the Fluosolid roaster in blast roasting.

I will say that, rather than the properly so-called mine development work, I specialized in ore dressing, smelting and refining during my career as a metallurgical engineer. I have recovered lead in Spain; copper, lead, and gold in Yugoslavia; copper in Bulgaria; and now lead in Algeria as well as copper in French Morocco. I admit it is a specialization in which I have a passionate interest.

I would like to call your attention to the importance of the Akjouit copper deposit now being developed in French Mauritania. The metallurgical problem of treating this ore is not simple. The method of treatment will undoubtedly control the success of the operation.

Rene Cardot
Paris, France

Read At Indian Emerald Mine

Dear Sir:

I have read the August 1952 issue of World Mining and have found it contains useful and latest information about various mines and miners of the world, and also about new discoveries and development plans underway in various countries.

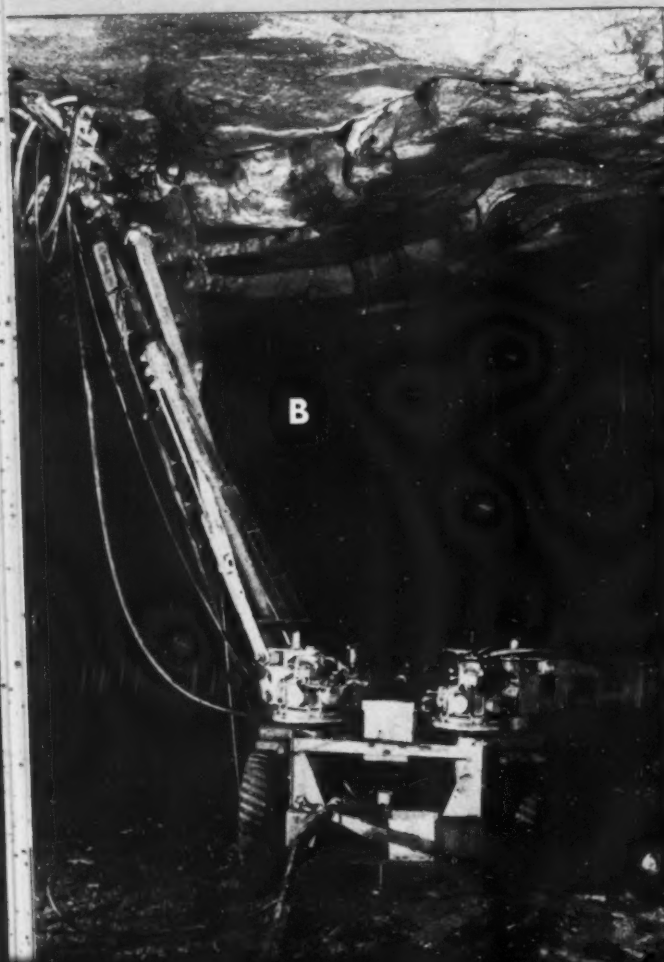
R. S. Bagheta
Mining Engineer
Emerald Mines Camp
Rajasthan, India

JOY

A



B



C



D



MECHANIZED EQUIPMENT

reduces costs—increases tonnage

... does the **DRILLING, LOADING** and **HAULING JOBS** with **TOP EFFICIENCY**

JOY DRILLMOBILES

In photograph B on the facing page, the long reach of a JOY Drillmobile is being utilized in taking down back. These rubber-tired, self-propelled, twin-boom units are setting new standards of fast, low-cost drilling in modern trackless mining, both in the metal and non-metallic fields. JOY Drillmobiles are fast-tramming, highly maneuverable machines, available in three sizes for work in any size heading or in stopes where the grade is not too steep. Drills can be equipped with long feed or standard drifter cradles and are mounted on JOY Hydro Drill Jibs, which make hole-positioning easy and accurate, and permit remote control for maximum safety. ● Write for Bulletin 87-F.

JOY 18-HR-2 LOADERS

Photograph A at the top of the page at left shows a JOY high capacity, continuous-type Hard Rock Loader in operation, loading into a JOY Shuttle Car in one of the mines of the Southeast Missouri Lead Belt. This heavy-duty, crawler-mounted machine loads up to 12 tons per minute, producing high tonnage at low cost in trackless mining. It is ruggedly built to handle hard and abrasive rock and ores. The JOY gathering mechanism (not shown in the picture) assures top efficiency, and the chain conveyor swings 45° to either side of center to meet various loading requirements. A smaller model, the JOY 17-HR Loader, is built for use in more restricted areas. ● Write for Bulletin J-108.

JOY SHUTTLE CARS

The versatility and flexibility of JOY Shuttle Cars in metal and non-metallic trackless mines is well illustrated by the photographs on the opposite page. In photos A and C, JOY Model 60 Shuttle Cars are shown being loaded by a JOY Hard Rock Loader and a scraper, respectively; and in photograph D, a car is shown making fill. JOY Model 60 Shuttle Cars (up to 14 tons capacity) are designed to give you rapid and low-cost transferring of rock and ore from loading points to main haulage systems. They are ruggedly-built, fast-tramming cars, with conveyor bottoms to speed loading and unloading and are available with hydraulic cable reel, trolley or diesel drive to suit operating conditions. ● Write for Bulletin J-200.

JOY SLUSHERS

In photograph C on the facing page, a JOY electric motor-operated three-drum Slusher is shown mounted over a scraper ramp, which in turn is mounted on a JOY Drillmobile chassis for easy maneuverability in a Southeast Missouri mine. JOY Slushers are available in a full range of two and three-drum models, including air or electric-powered types, adaptable for automatic or remote control if desired and built for heavy duty with low maintenance. Allied JOY equipment includes a complete line of air, electric or gasoline engine-powered single-drum Hoists, Air Motors and Winches, Carpullers and Ropepullers, Sheave Blocks and Scrapers. ● Write for Bulletin 76-Y on JOY Slushers and Bulletin 76-X on JOY Hoists.

Consult a Joy Engineer

WBD M3303

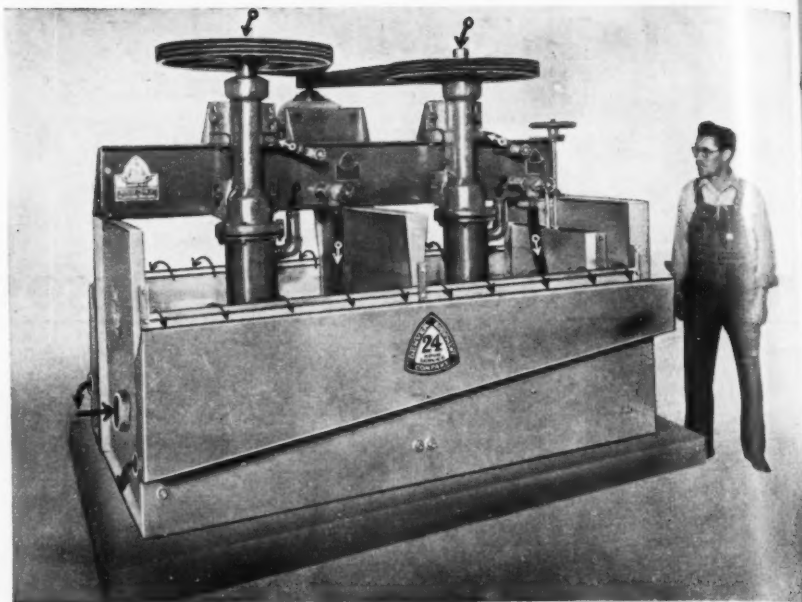
JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



Recovery of minerals normally lost in tailings has been amazing due to use of the New Denver "Sub-A" Super Rougher Flotation Machine. The ability of these machines to lower tailings and *pay for themselves in a short time* has been proved.



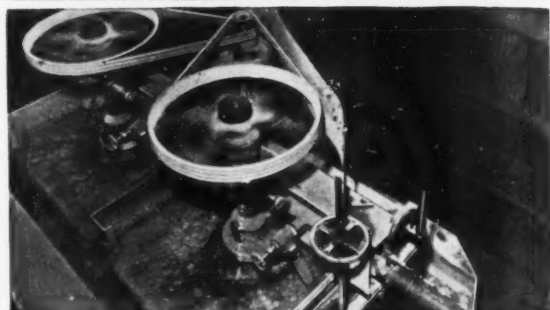
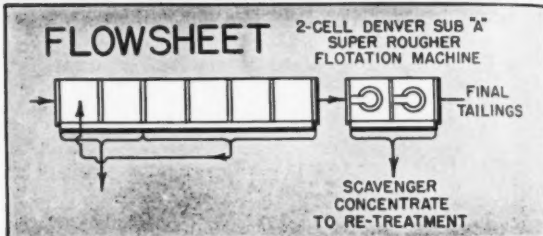
NEW DENVER "SUB-A" SUPER ROUGHER REALLY GETS PROFITS FROM TAILING CIRCUIT

New "Sub-A" Principle

The New Denver "Sub-A" Super Rougher Flotation Machine has a double impeller mechanism—one imposed above the other. The upper impeller gives additional aeration and lifts lagging mineral over the froth overflow. This super aeration gives a deep frothy concentrate. The openflow type tank design handles large tonnage. Froth overflows both sides for quick removal of the difficult to float minerals. Many features of flexibility are provided to give the operator an opportunity to adjust cells for the particular ore being treated.

Trial Offer

We are so confident that Denver "Sub-A" Super Rougher Flotation Machines will lower tailings in your mill that we want you to see for yourself what this machine will do. We will send you one of these NEW Denver "Sub-A" Super Rougher Flotation Machines to try out in *your* mill. If you are not satisfied, just return the machine to us without obligation.



ABOVE: Operators estimate \$30,000 per year saved by lowering tailings losses. BELOW—another new large mill equipped with Denver "Sub-A" Super Rougher Flotation Machines. See for yourself in your own mill what they will do for you.



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DENVER 17, COLORADO

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... Over 25 years of Flotation Engineering



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Include information on Automatic Rebuilding and Hard-Facing ☐

NAME

TITLE

COMPANY

STREET

CITY STATE



Strips, Clears, Pulls scoop

says veteran Illinois dirtmover about Tournadozer

After 18 years of coal mine stripping and other dirtmoving, Ivan Wright, Peoria, bought his first rubber-tired Tournadozer last year. Now, with more than 2500 hours on this 19 m.p.h. rig, he says, "There's not a crawler-type machine made that will move the amount of dirt Tournadozer will!" For example:

Stripping — On job pictured here, Tournadozer, working alone, stripped 40 ft. of overburden at a small coal mine near Glasford, Illinois. Tournadozer removed all slate and refuse including 1 foot of tough cap rock so that coal had only to be shot and hauled out.

Clearing — Wright assigned 2 dozers to clearing brush and trimming banks for a road. He put a Tournadozer in one ditch and a crawler in another. "Tournadozer walked away from the crawler," he says. "Never

found a tree the Tournadozer couldn't take out . . . takes a tree up to a foot in diameter in one pass."

Pulling a scoop — On typical earthmoving, Wright's Tournadozer pulling a 15-yd. scraper averaged 15 trips (150 pay yds.) of heavy clay hourly on 400' cycles, according to time studies made by a Government Engineer. "Working with a scoop," says Wright, "you can load in 2nd gear and dump in 3rd . . . can double production of a crawler-pulled scraper. Tournadozer is the best rig to pull a scoop that I've ever seen or used." Rig has 186 h.p. with 4-wheel drive.

Dozing up steep grades — "Working in 6 to 7'-deep channel," reports Wright, "Tournadozer would come up 3-to-1 slopes with a load whereas crawler *could not* make the slopes with a load." (Tournadozer's constant-mesh transmission lets you change speed under load without loss of vital momentum . . . 186 h.p. and 4-wheel drive give you plenty of power to work up steep, slippery grades.)

TWICE AS FAST ON 85% OF YOUR DOZING WORK



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cycles,
Engi-
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come
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con-
under
5 h.p.
work

RNEAU
ET



Removing overburden at mine near Glasford, Tournadozer, working alone, strips 40 ft. of clay, sand, shale and soapstone, moving overburden on average of 200 ft. One foot of cap rock just above coal seam was also removed by Tournadozer, leaving coal ready to shoot and haul out.

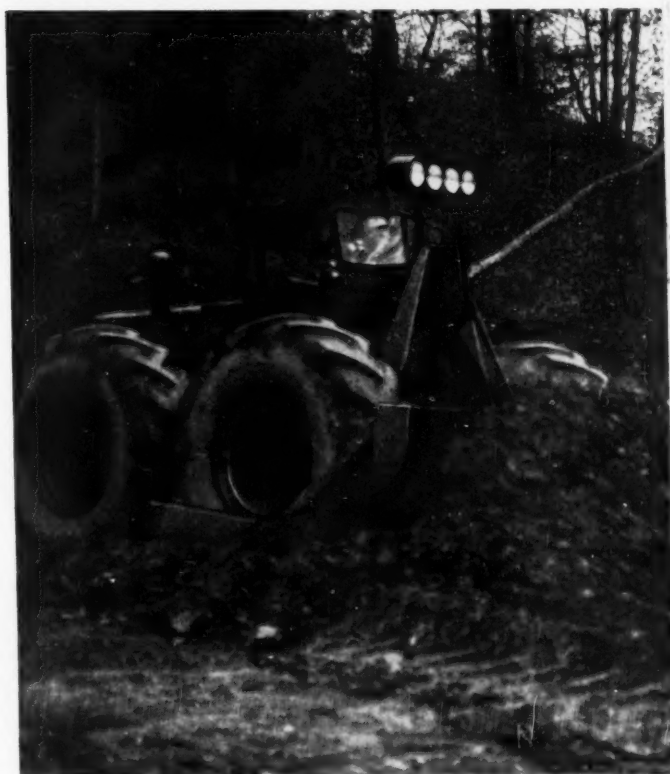
After 2500 hours, Tournadozer tires still have about 85% of original tread. During this period, the rig has been 95% mechanically efficient.

Job-to-job moves—In 2500 hours of scattered assignments, Tournadozer has never been on a trailer . . . travels any time, anywhere over main roads, under its own power, at speeds to 19 m.p.h. "Up to 50 miles, you can move Tournadozer as fast as you can a crawler with a truck," says Wright. You waste no time loading, blocking . . . save time shuttling between assignments or traveling to neighboring spreads.

Ease of operation—Comparing Tournadozer with crawler rigs, Wright reports, "Tournadozer is much easier to operate—no work to it." No wasted time or effort clutching . . . Tournadozer changes speed instantly with movement of speed selector switch. Big 18.00 x 25 low-pressure tires take up many of the shocks of uneven ground . . . save wear and tear on operator as well as machine.

Be your own judge of what Tournadozer can earn on your operations. To help you make estimates, ask your LeTourneau Distributor for owner-verified field reports covering all types of working conditions . . . or have him demonstrate one of these high-speed rigs in your pit. Meanwhile, write direct for bulletin TD-117 describing design and construction.

Tournadozer—Trademark Reg. U.S. Pat. Off. D-145-CM



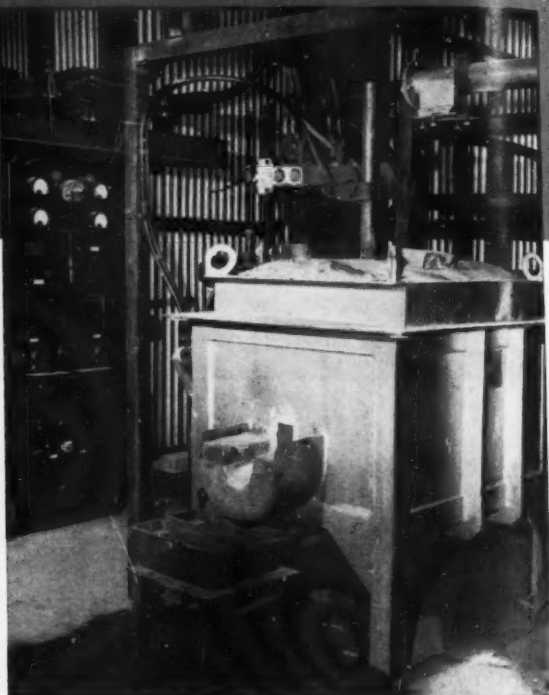
LETOURNEAU
PEORIA, ILLINOIS

TOURNADOZERS

Weirton Steel recovers scarce tin and steel scrap with the help of three *Lectromelt** furnaces



Two Lectromelt Reduction Furnaces handle final recovery of tin from scrap at Weirton Steel Co., Division of National Steel Corporation, Weirton, West Virginia.



Sludge formed in tin mill operations emerges from this third Lectromelt Furnace as commercially pure tin.

Baled scrap from the tin mill and other sources is sawed open to expose a maximum surface to the detinning bath—a 50% solution of sodium hydroxide containing sodium nitrate. The tin dissolves and precipitates as a slurry, which is filtered out and treated to form tin oxide. The bare steel is ready for remelting.

A mixture of this oxide and fine anthracite coal is charged into one of two Lectromelt Furnaces, where carbon unites with the oxygen to free the tin. Furnaces are tapped on a 6-hour cycle and tin is

cast in 100-pound pigs for shipment to the tin mill.

A second recovery plant at the tin mill recovers the tin from the sludge that accumulates in the plating cells of the electrolytic lines. Thus scarce tin is salvaged in both operations and steel scrap, which otherwise would be undesirable because of its tin content, is reclaimed.

For information on Lectromelt Furnaces, write Pittsburgh Lectromelt Furnace Corporation, 324 32nd Street, Pittsburgh 30, Pa.

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

*REG. T. M. U. S. PAT. OFF.

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MOORE RAPID
Lectromelt



Smooth starting is important in grinding mills, too!

Traylor Grinding Mills require less power

The starting torque of a machine largely determines its power requirements. In addition, the greatest wear occurs from the time a machine is first started until it reaches its normal operating speed.

This is very true of grinding mills. Traylor has solved this problem by using main bearings of Meehanite* metal. Each bearing is fitted with a high pressure Alemite pump. This pump coats the trunnion with a film of grease which lifts and floats the mill to overcome high starting torques and eliminates undue wear caused by "dry" starting.

If you have a grinding problem, clip coupon for bulletin 7121. You'll be off to a good start in solving it with a Traylor grinding mill.

TRAYLOR ENGINEERING & MANUFACTURING CO.

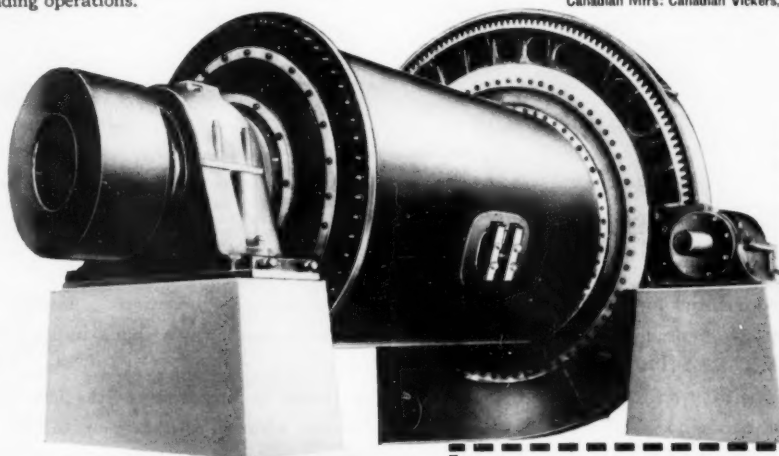
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SALES OFFICES: New York • Chicago • San Francisco

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TRAYLOR BALL MILLS grind efficiently to 200, even 325 mesh. Both overflow and diaphragm discharge types available.



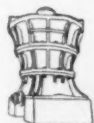
Send complete information on Traylor's full line of grinding mills.

Name: _____

Position: _____

Company: _____

Address: _____ State: _____



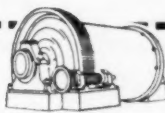
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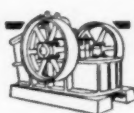
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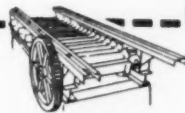
Secondary Gyratory Crushers



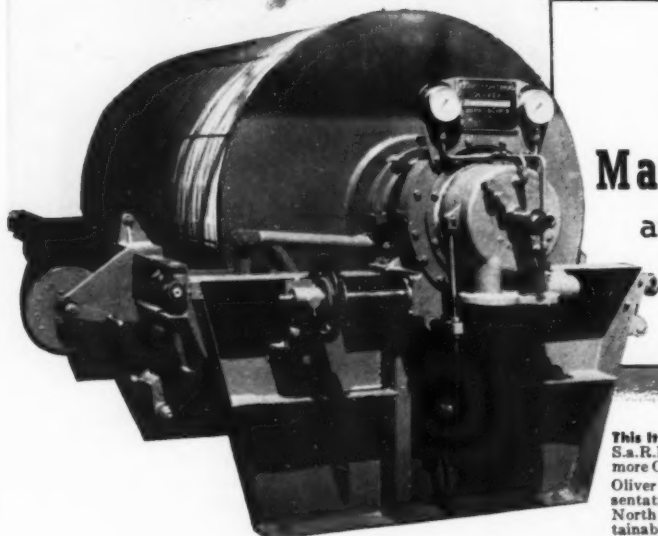
Ball Mills



Jaw Crushers



Apron Feeders



Worldwide Manufacturing Facilities

another strength of the Dorrco
Worldwide engineering
network

This Italian made Oliver Rotary Drum Filter, fabricated by Dorr-Oliver S.A.R.L. of Milan, is typical of OUF drum filter design. Today, there are more Oliver's employed in worldwide metallurgy than any other make. Oliver Filters are available through Associated Companies and Representatives of The Dorr Company in every mining area of the world except North America, Australia and the Philippines, where they are directly obtainable through Oliver-United Filters, Inc.

Strategically located facilities for the manufacture of Dorr and Oliver equipment are available in eleven countries of the world. These facilities for local fabrication, coupled with the sales engineering and technical services available through the following Associated Companies and Representatives of The Dorr Company abroad, provide a completely flexible net-

work of engineering organization . . . established to serve worldwide metallurgy with maximum effectiveness.

We invite you to consult any of the following, or, if you prefer, address your inquiry to The Dorr Company at Stamford and it will be forwarded to the area best able to serve you.

In Europe: Dorr-Oliver Companies in England, Belgium, The Netherlands, France, Germany and Italy.

In South Africa: E. L. Bateman Pty., Ltd., Johannesburg.

In India: Dorr-Oliver (India) Limited, Bombay.

In Australia: Hobart Duff Pty. Ltd., Melbourne.

In Japan: Sanki Engineering Co., Ltd., Tokyo.

In South America: Fiore Company in Buenos Aires; Serva Ribeiro in Rio de Janeiro and Sao Paulo; John Lindsay in Caracas; and conveniently located Dorr Resident Engineers.



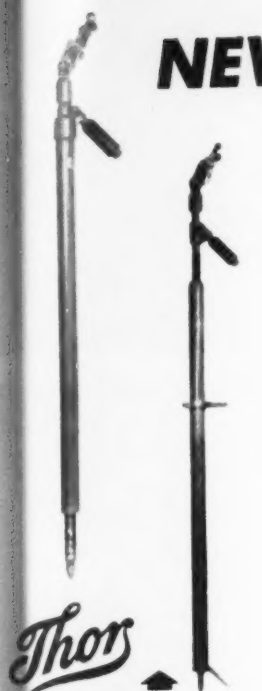
Better tools TODAY to meet tomorrow's demand

DORR

WORLD - WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.
Offices, Associated Companies or Representatives in principal cities of the world.

NEW *Thor* SINKER LEGS STOPERS . . . POWER FEEDS for THOR DRIFTERS AIR BAR FEEDS • SUMP PUMPS



SINKER LEG

Tool-proof Controls . . . "Around the Cylinder" Clamping . . . Compact air feed leg clamps to standard Sinker Rock Drill . . . Drills Holes at any angle.



STOPERS & STOPER LEGS

STOPER LEG supports and feeds Sinker Rock Drills for overhead drilling.

STANDARD AND REVERSE FEED STOPERS

in three sizes, six models to handle all stoping and other overhead drilling operations. Reverse Feed for horizontal positions on pneumatic columns.



ON-THE-JOB TESTS PROVE Thor mining tools cut operating costs, reduce air consumption, save labor, and increase productive output. The new Thor Sinker Leg, for example, is the sensation of the mining industry, giving 45% more footage at far less than usual cost!

For on the job demonstrations of any of these great new Thor tools, write or wire Independent Pneumatic Tool Co., Aurora, Illinois.



SUMP PUMPS

Self-priming . . . operate efficiently in dirty water, oil . . . partially, or fully submerged. Exclusive large capacity lubricating system lubricates all moving parts up to a full shift.



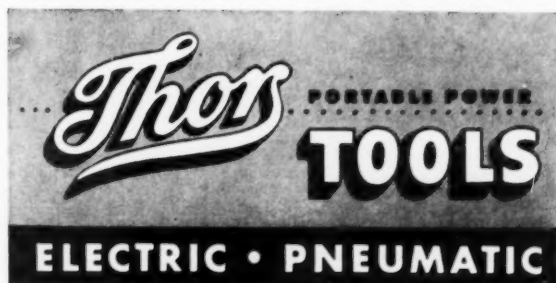
POWER FEED DRIFTERS

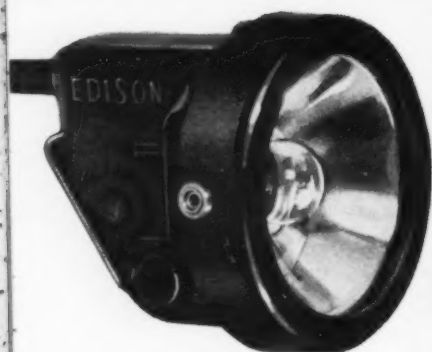
POWER UNIT operates drill on shell independently of Drifter—no vibration during rapid advance or return . . . no recoil, positive spring cushion stop, better balance—for LONGER TOOL LIFE. Perfect for carbide bit drilling. Perfect control at ALL drilling speeds. 25% more efficient—by actual mine tests!



AIR BAR FEEDS

AIR BAR FEED supports and feeds Drifters and Sinkers. Converts hand-crank Drifters—and Sinkers—to power feed, forward and reverse. Feeds from any position, in any direction.





HEADPIECE HOUSING

Molded of tough, lightweight bakelite. Designed to direct the light to the job.



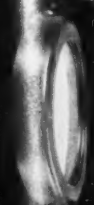
DOUBLE FILAMENT BULB

Two filaments of equal light output in one bulb. If one filament burns out, second filament restores full light.



ADJUSTABLE CRADLE

Positive screw control moves bulb cradle for accurate spot-beam focusing.



BEZEL RING AND LOCK

Sturdy bezel makes seal, is easily removed. Contains rubberized lens. Locks prevent tampering.



EXCLUSIVE NICKEL-IRON-ALKALINE CELLS



Battery does not destroy itself to function; does not deteriorate when not in use. Welded steel containers enclose the cells and the entire battery is encased in a high-strength, non-combustible corrosion and impact resistant molded nylon case. The valve block is one-piece nylon construction; easily removed. All exterior metal parts are stainless steel. Rugged hood contains dependable magnetic lock device.

THE EDISON R-4

... is worth looking into

Convincing testimony that **QUALITY COUNTS** in underground illumination is provided by the world-wide acceptance of the Edison Electric Cap Lamp.

Designed from a thorough knowledge of overall mining problems, the Edison R-4, made up of compact, easily handled sub-assemblies, has the

QUALITY features that keep a brilliant, unfailing beam on the job, shift-after-shift, for years.

We'll be glad to show you how this **EDISON R-4 QUALITY** can put new peaks on your production records, safely.



*When you have a safety problem, M.S.A. is at your service.
Our job is to help you.*

MINE SAFETY APPLIANCES COMPANY

Braddock, Thomas and Meade Streets, Pittsburgh 8, Pa.

At Your Service:

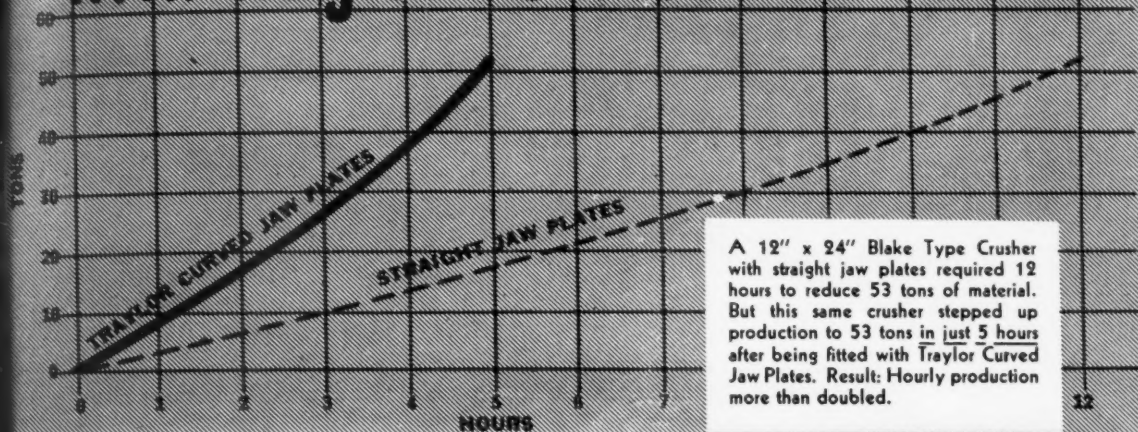
69 Branch Offices in the United States & Mexico

MINE SAFETY APPLIANCES CO. OF CANADA, LIMITED

Toronto, Montreal, Calgary, Winnipeg,

Vancouver, New Glasgow, N.S.

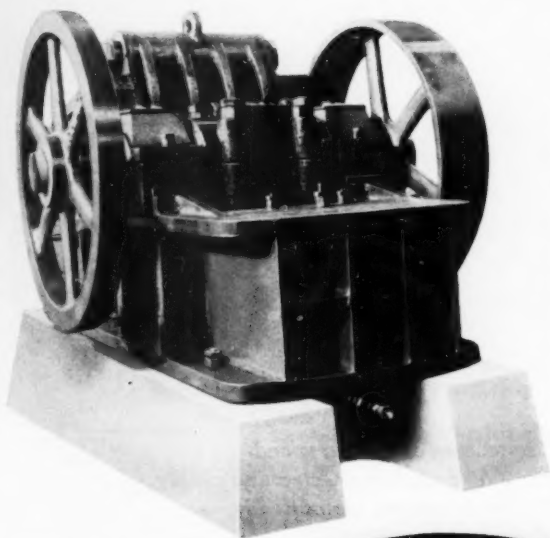
Production curves rise with Traylor's Curved Jaw Plates



A 12" x 24" Blake Type Crusher with straight jaw plates required 12 hours to reduce 53 tons of material. But this same crusher stepped up production to 53 tons in just 5 hours after being fitted with Traylor Curved Jaw Plates. Result: Hourly production more than doubled.

**Less time out for maintenance
Greater tonnage by the hour**

Traylor JAW CRUSHERS



Traylor Jaw Crushers, with their curved jaw plates, put a two way squeeze on rising costs. In dozens of actual installations Traylor Curved Jaw Plates have outlasted conventional plates 3 to 1. Traylor curved jaw plates wear evenly over all . . . retain their original curved surfaces indefinitely. In addition, these Traylor Curved Jaw Plates produce greater capacities . . . even at finer settings. Each succeeding zone in the crushing chamber is of greater capacity, so choking and packing are practically eliminated. Investigate Traylor Jaw Crushers today by sending for free Bulletin. Coupon will bring your copy.

TRAYLOR ENGINEERING & MFG. CO.
543 MILL ST., ALLENTOWN, PA.

Sales Offices: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

PICK the right Jaw Crusher for *your* needs from one of Traylor's four different types. Each is built in a wide range of sizes. Feed openings range from 8" x 12" to 60" x 84"; Capacities from 3 to 1000 tons per hour.



O.K. Let me see complete specifications and descriptions on Traylor Jaw Crushers.

Name: _____
Position: _____
Company: _____
Address: _____ State: _____



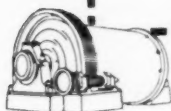
Primary Gyrotory Crushers



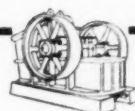
Rotary Kilns



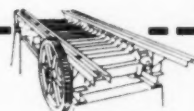
Secondary Gyrotory Crushers



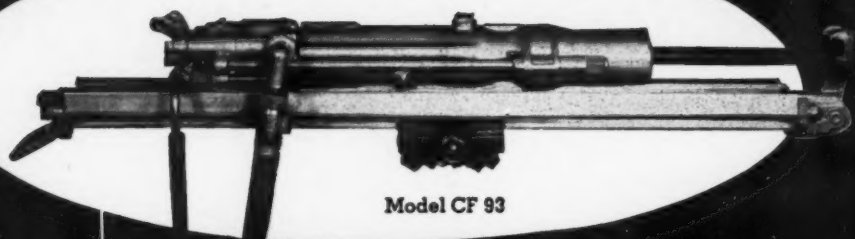
Ball Mills



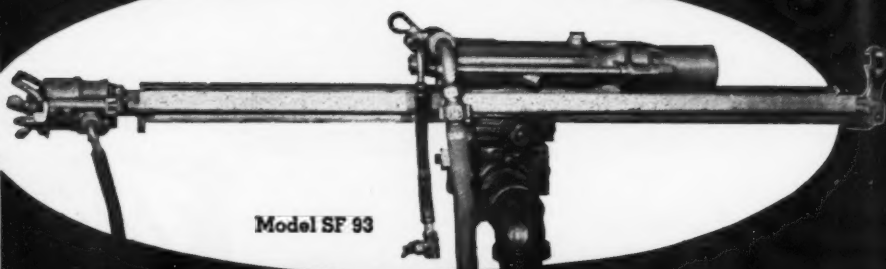
Jaw Crushers



Apron Feeders



Model CF 93



Model SF 93

Introducing the 3½" GARDNER-DENVER 93
...the **EAGER DRIFTER!**

Equals most 4" machines in drilling speed.
Exceeds all other 3½" drills in hole-cleaning ability.
Maintains correct bit pressure automatically —
regardless of ground changes.
Long feed aluminum alloy mounting — with automatic
feed motor on drill backhead or on guide shell.
Ask for Bulletin DD-2 — it gives complete specifications.

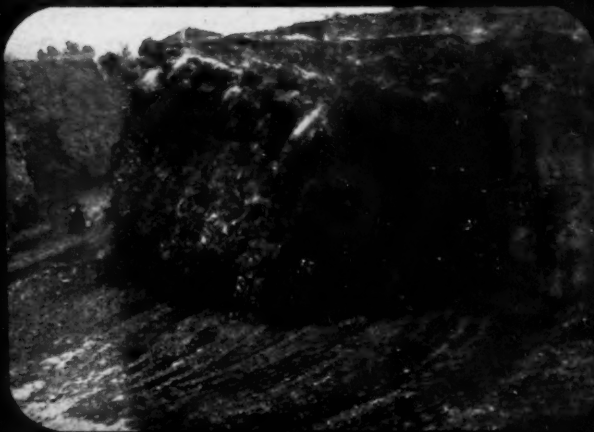
SINCE 1859

GARDNER-DENVER

Export Division: 233 Broadway, New York 7, N.Y. U.S.A.
Gardner-Denver Company, Quincy, Illinois, U.S.A.

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

Here's how ROCKMASTER® blasting increases explosives efficiency



YOU can see ROCKMASTER efficiency in these pictures, taken at the height of four different ROCKMASTER blasts. There is no flying rock, no geysering of explosive force. ROCKMASTER keeps the power of the blast confined, using all the explosives energy to produce maximum breakage with maximum efficiency.

When the blast is initiated at the point of maximum confinement, the explosive force follows the line of least resistance . . . directly into the burden. With ROCKMASTER millisecond blasting, the first initiation places the burden under maximum stress, producing lines of weakness

throughout the burden. A split-second later, the next charge hits the stressed material with a shattering force that produces maximum breakage . . . maximum use of the explosive force. It is the "one-two punch" applied to blasting.

Ask your Atlas technical representative to show you the picture presentation of the ROCKMASTER story. See for yourself how the millisecond delay electric blasting caps teamed with the ROCKMASTER system of explosives choice can give you greater blasting efficiency through complete confinement of the blast.



ATLAS EXPLOSIVES

"Everything for Blasting"

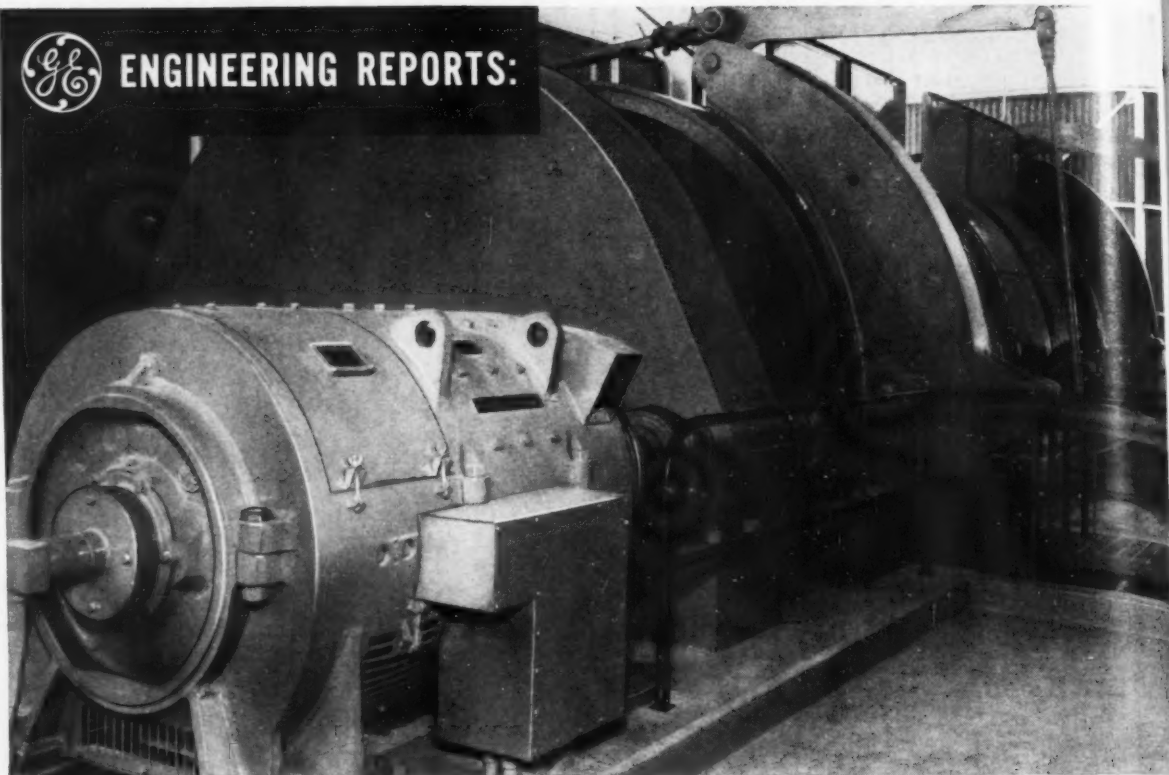
ATLAS POWDER COMPANY
SAN FRANCISCO 4, CAL.
SEATTLE 1, WASH.

Offices in principal cities

FEBRUARY, 1953



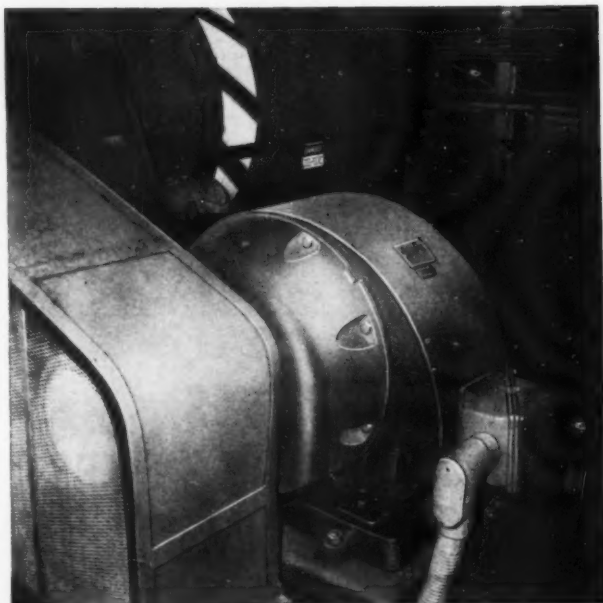
ENGINEERING REPORTS:



AUTOMATIC MINE HOIST at Duval—amplidyne-controlled and driven by a 600-hp G-E MDP motor—hoists 6 tons of ore

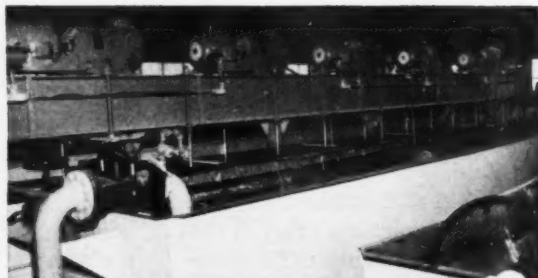
up 1628 feet in 103 seconds. Maximum speed is 1100 fpm. Loading, acceleration, deceleration and dumping are all automatic.

Co-ordinated electric equipment

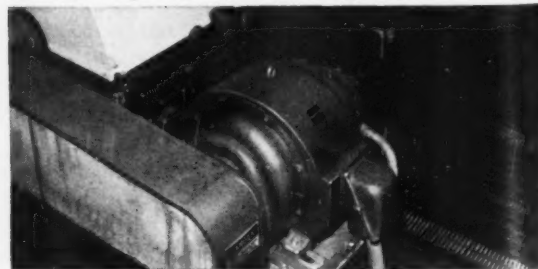


ROD MILL inside refinery is driven at 19 rpm by a 720-rpm G-E Tri-Clad* synchronous motor rated 250 hp, 440 volts.

*Registered Trade-mark of General Electric Company.



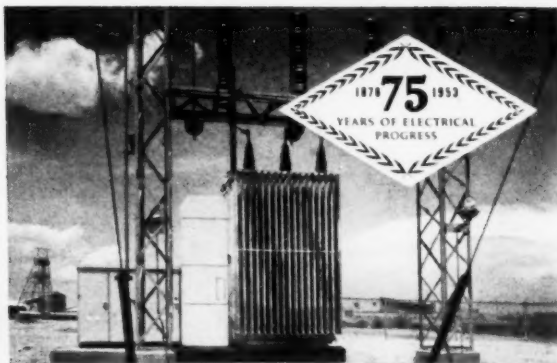
FLOTATION CELLS shown are agitated by five 5-hp G-E motors, totally enclosed, fan-cooled against corrosive vapors.



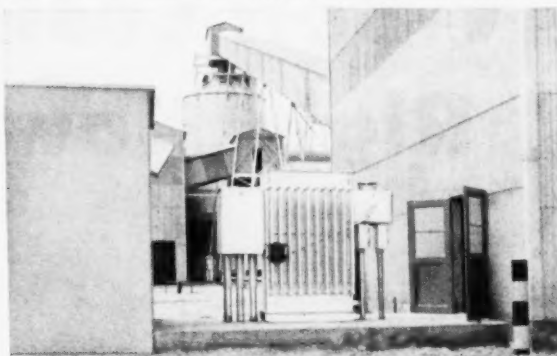
CENTRIFUGES, another step in the process, are driven by these 150-hp G-E Tri-Clad wound-rotor motors.



CONTROL OF MAIN ORE HOIST can also be manual by means of master control located in this hoist console.

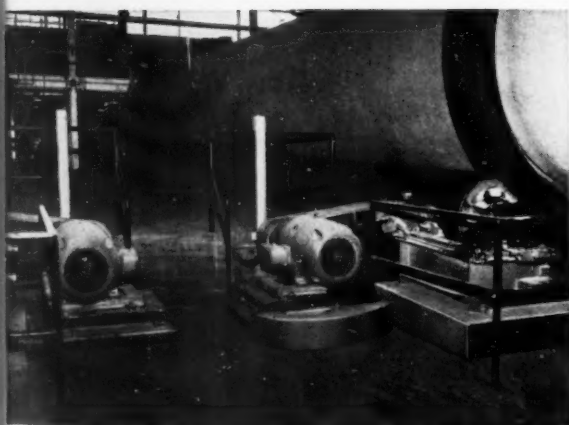


POWER purchased by Duval is stepped down from 67,000 to 4160 volts at this G-E 5000-kva master unit substation.



DEPENDABLE G-E TRANSFORMERS step down 4160 volts to 480/277 volts grounded-neutral at 6 utilization areas.

keeps Duval potash output high



DRYING KILNS, where the refined potash is prepared for shipment, are driven by 40-hp G-E totally enclosed motors.

System engineered for efficient operation of automatic hoist and refinery drives

Typical of the way General Electric helps mining companies handle high tonnages at low cost is the new potash mine and refinery of the Duval Sulphur and Potash Company at Carlsbad, N. M. General Electric supplied power transformation equipment, refinery motors, and mine-hoist electric equipment.

G-E engineers—working closely with engineers of Duval Sulphur and Potash Co. and their engineering contractors, Stearns-Roger Mfg. Co.—applied this co-ordinated drive equipment to meet Duval's needs most efficiently and economically.

To put this kind of engineering leadership to work on *your* ore mining or processing problems, contact your local G-E Apparatus Sales Office—early in your planning. General Electric Co., Schenectady 5, N. Y.

660-27

Engineered Electrical Systems for Ore Processing

GENERAL  ELECTRIC

Cut Your V-Belt Costs Right Now!



—this test tells how!

If you want longer V-Belt wear and lower V-Belt costs just make this simple test. Bend any V-Belt that has *straight sides* and—as it bends—*feel* the sides bulge out! (See Fig. 1-A, below)

This out-bulge forces the belt to press unevenly against the V-pulley and of course wear on the belt is concentrated where it bulges most. Naturally this shortens the life of a *straight-sided* V-Belt.

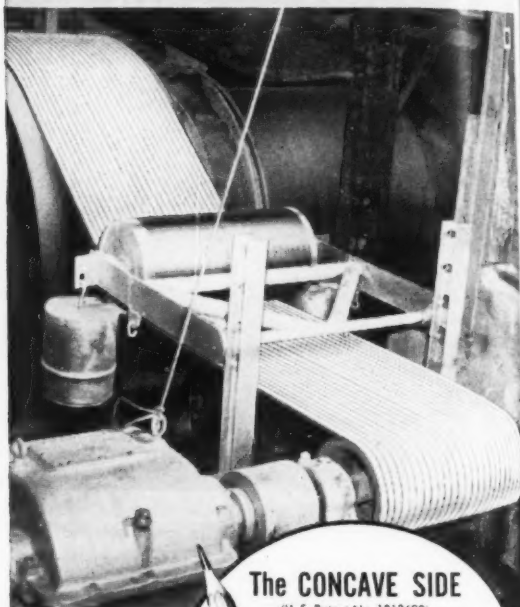
Now, make this same test with the belt that is built with *concave sides*—the Gates Vulco Rope!

See the difference? There is no *out-bulge*! The precisely engineered concave sides *fill out* and become *perfectly straight*. They now *exactly fit* the sheave groove and therefore *press evenly* against the V-pulley. This distributes all wear *uniformly* across the *full width* of the Gates Vulco Rope. And this means longer belt life and *lower belt costs* for you.

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with Concave Sides—the Gates Vulco Rope!

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

Silica dust quickly wore out the gear and pinion drive on this sand drying drum. So a Gates man suggested building a flat pulley around the drum (as shown) and running V-Belts on it. Mr. M. D. Pinkerton, plant superintendent, says, "It cost about \$4500 to make the change but we are saving about \$13 per day without a bit of trouble. The original Gates Vulco Ropes are still good after running every day since September, 1949."



The CONCAVE SIDE

(U. S. Patent No. 1813698)

What Happens When a V-Belt Bends

Straight-Sided V-Belt



Fig 1



How a Straight-Sided V-Belt Bulges in the Sheave-Groove. Sides Press Unevenly Against the V-Pulley, Causing Extra Wear at Point Shown by the Arrows.

Gates Vulco Rope With Concave Sides



Fig 2



The Concave Sides Fill Out to Precise Fit in Sheave-Groove. No Side-bulge! Sides Press Evenly Against the V-Pulley —Uniform Wear and Longer Life!

CS-531



VULCO ROPE

DRIVES

THE GATES RUBBER COMPANY • DENVER, U.S.A.

V-Belts — Hose
Molded Rubber Goods
for Industry
World's Largest Maker
of V-Belts

- Drifts and Crosscuts -

WAKE UP UNITED STATES MINERS: Understand the dangers to the well being of the domestic mining industry operating under a free enterprise system where the individual has the right to find, locate, and own mineral deposits—a system of proven success but coming under constantly growing attacks by agencies of your own government. The latest attack was contained in the report of the National Security Resources Board to ex-President Truman when the Board recommended that a "modernized" mineral leasing system be instituted under which federal mineral lands would be leased. Ownership would not, of course, be permitted by private entrepreneurs.

Know of recent action by one of the top committees of the United Nations. Yes, the same United Nations for which the United States taxpayer foots the largest bill. The Economic and Financial Committee on which all 60 member nations are represented has voted approval of the right of any country to nationalize the development of its natural resources. Making the action even worse is the fact that the committee rejected amendments to the proposal which would require nationalizing countries to pay equitable compensation. The resolution which was approved reads in part as follows "... recommends further all member states to refrain from acts, direct or indirect, designed to impede the exercise of the sovereignty of any state over its natural resources."

Realize the thinking of men in key positions within the agencies of the federal government dealing with minerals. At the 58th annual convention of the Northwestern Mining Association, one of the authors of the "Paley Report" emphasized the fact that he was giving his own opinion when he stated that the federal government must have more and better confidential information belonging to private industries and obtained by them over many years at a tremendous cost in money and ingenuity. He said, "There have been, and still are, those (in federal government) who would like to have mandatory reporting of reserve and cost data."

Appreciate the dangers in the "Trade Not Aid" program of the National Labor-Management Council on Foreign Trade Policy, of the United States Council of the International Chamber of Commerce, Foreign Trade Council, and numerous foreign associations and companies which is designed to reduce United States tariffs.

Think what it would mean to the small prospector if he were forced to operate under a leasing system. Would he receive the same treatment from Washington agencies as the large corporations maintaining on-the-spot Washington expeditors? No so-called "modernized" or other system is needed. The law is plain, its content reaffirmed by United States Supreme Court decisions. Adequate and equitable law enforcement is all that is needed.

Think of the implications of the United Nations' committee. Already it has given much for Russia to shout about. Russia and its bloc has long used the U. N. and its branches as a forum for hammering away at the theme that the smaller nations and their citizens are being exploited ruthlessly by the larger, more industrialized, nations. If the committee-approved resolution is approved by the full plenary session of the General

Assembly, the government leasing advocates could expand their governmental philosophies.

It is clear where some of the ideas in the Paley Report came from. What is an ore reserve? Who, besides the report's authors, can predict the future? If government forces reporting, why not use a more realistic approach and secure production forecasts under several assumed price-cost-technology indicies.

As the organized cry for lower domestic tariffs is drummed and redrummed in the popular press, remember that free trade policies and the program for financing foreign mines has caused the recent severe drop in lead and zinc prices. Don't be mislead. The United States is not a high tariff country. The Reciprocal Trade Agreements Program has lowered the average tariff from 46.7 percent in 1934 to 12.5 percent in 1951. The relative duties in cents per pound on lead and zinc have declined to only a fraction of the metals' values.

Remember that few, if any, foreign nations have equalled the United States record of tariff reductions. Italy is considering the raising of its lead and zinc tariffs.

Wake up, United States Miners. Write your Senators and Congressmen. Get behind the "sliding scale equalization tax" on metal imports.

DOMESTIC DEVELOPMENTS: Life insurance firms are backing taconite. . . . A group of companies purchased \$148,000,000 worth of first mortgage 4.25 percent bonds due in 1980 and issued by Reserve Mining Company. . . . The financing plan, one of the biggest ever for a mining operation, insures first Reserve taconite pellets from Babbitt Bay in 1955. . . . DMPPA has loaned \$750,000 to Eureka Corporation, Limited as one-quarter of estimated cost to dewater Fad shaft at Eureka, Nevada. . . . The 2,250-foot level was flooded by more than 10,000 gallons of water per minute in March 1948. . . . Oil companies in Utah are finding more and more uranium ore on their oil and gas leases in San Juan and Grand counties, Utah. . . . In some instances mining claims preceded the oil and gas leases. . . . In other instances oil and gas leases preceded the mining claim locations. . . . The Great Basin Oil & Leasing Company and the Mayflower Company are now developing their uranium holdings.

ACTIVITY ABROAD: Records for large cross-sectional tunneling and sinking have been established. . . . In the Orange Free State, Africa, the seven-compartment, 46-foot 10-inch by 10-foot (inside concrete lining) vertical No. 2 shaft of the Loraine Gold Mines, Ltd. was sunk 370 feet to a total depth of 3,470 feet in 30 days. . . . In British Columbia, Canada, the Morrison-Knudsen Company of Canada drove the Kemano tunnel 275 feet in a week, or 45.7 feet per day. . . . The modified horseshoe-shaped tunnel has a face area of 527 square feet. . . . United States Steel Company and French mining firms have started development of manganese deposits in Gabon, French Equatorial Africa.



"Couldn't get along without it"

Floyd Serpa, General Surface Foreman,
Mountain Copper Co., Matheson, Calif.



Stockpiling is the main job of this Caterpillar D6 Tractor with No. 6A Dozer and D6N Hyster Winch. Among other tasks, it maintains roadways, works on the tramline and, in the winter, keeps 10 miles of blacktop clear of snow, often plowing through 6-foot drifts. Foreman Floyd Serpa, Mountain Copper Co., says: "Our D6 is ideal for our uses. It's handy, easy to transport and able to handle all work. Couldn't get along without it."

This two-fisted rig is shown hefting a 4 to 5 ton load of iron pyrites from stockpile to conveyor cars. Average production over a 75-80 foot haul: 60 tons every 10 minutes. The ore, incidentally, weighs 7,000 lbs. per cu. yd. The D6 with Dozer can load out 30 or more 60-ton cars per day. Good going? Yes, and here's another typical D6 performance for Mountain Copper. With Hyster Winch, it does a rope replacement operation along the

4-mile tramway in 4 days, slashing 3 whole days from the 7 the task used to take!

Like all Caterpillar equipment, the D6 is ruggedly built to stay on the job and out of the shop. Its capacity for long life is increased by the use of genuine parts, when needed, and by service from your Caterpillar Dealer. Ask him to show you why it's good business to standardize on big yellow machines. He'll also be glad to demonstrate for you!

CATERPILLAR, SAN LEANDRO, CALIF.; PEORIA, ILL.

CATERPILLAR

REG. U. S. PAT. OFF.

**DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT**



CAPITOL CONCENTRATES

PROPOSE COPPER IMPORT TAX SUSPENSION TO JUNE 30, 1954

Representative James T. Patterson of Connecticut has served notice of his intention to renew his fight to suspend the import tax on copper. His resolution will ask that the tax of 2.0 cents a pound be suspended until June 30, 1954. The present act suspending the copper import tax will expire on February 15, 1953.

Extension of the present tariff suspension, Patterson said, will not impose a hardship on any segment of the economy, but will prevent loss of "jobs and livelihood of workers in the brass industries of the Naugatuck Valley" due to shortage of copper.

Patterson also plans a second measure to spell out the details of further duty suspension. This measure could be the subject of public hearings to permit opponents to present arguments against long-term suspension.

Meanwhile, the U. S. Tariff Commission has issued a report on the U. S. supply-demand situation with respect to copper. This report declares that current shortages will continue beyond the expiration date of the import tax suspension act.

The Tariff Commission described the present situation with respect to copper as follows:

"The supply of copper in the United States is still regarded in the trade to be insufficient to meet the demand. Consumers are buying all of the foreign copper available to them even at the high price of 36.5 cents a pound. Some consumers have joined the domestic producers recently in urging decontrol of the price of copper. Although they realize that this may raise the domestic price of copper—perhaps to about 30 cents a pound—they have urged this step because they believe it will result in a larger supply of copper, especially in an increased flow of scrap copper to copper refineries."

The commission commented that an end to the current shortage depends on many unpredictable influences. Among those listed were changes in the rate of copper consumption for armament and strategic stockpiling, the level of general industrial activity in the United States and elsewhere, the copper-pricing policies put into effect by both the United States and Chile, and the speed with which new production facilities are completed.

• DMPA's Job Nearly Completed

By the end of June, Defense Materials Procurement Agency will be in position to and should go out of existence unless an emergency develops, said Jess Larson, outgoing DMPA-GSA administrator. By that time, he explained, the requirements of the stockpile will have been met or operations will have been geared to that goal's achievement.

Whether or not DMPA goes out of business remains to be seen. What Larson really means is that he wants to see the functions of DMPA absorbed into GSA.

Larson commented that the stockpile is in "good shape," taking into consideration the many factors of the international and political situations. In addition, the major projects which DMPA has developed are either in the mill or have been completed, he added, and the

amended copper program is now at DPA awaiting approval.

DMPA's activities are closely affiliated with General Services Administration, and the latter organization could carry on foreign activities where necessary, he said. A smaller foreign staff would service the long-term contracts for band one items under the plan Larson advanced.

The big problem which the domestic mining industry faces, stated Larson, is how to maintain free enterprise and "continue to absorb the violent price fluctuations."

• Is It All There?

Republican Representative Carroll D. Kearns of Pennsylvania wants to know if all \$12,483,415,360.28 of the government-owned gold is still buried at Fort Knox, Kentucky. He has introduced a bill in Congress calling for the creation of a special House committee to count the gold personally.

Kearns commented that such an inspection is "very important now that the Democrats are going out of office."

A similar demand was voiced last year by the Daughters of the American Revolution at their annual convention, but they were unable to secure any official support for the proposal.

• Stockpile Figures Can Be Misleading

In spite of optimistic statements to the press that we have reached the half-way point in government stockpiling of raw materials, it must be remembered that the reports are in dollars and do not represent necessarily the actual physical material in storage. Of the \$129,000,000,000 appropriated since Korea, only \$41,000,000 of real inventory have been accumulated, with 50 per cent of the balance being materials on order. Furthermore, some of the things we need the most, but which bulk small in dollar value, may be the lowest in point of actual inventory. Any published stockpile statistics in dollars should be viewed with more than a little skepticism. It is one thing to have a contract for chrome still in the ground in Turkey and quite another thing to have the ore here ready to pitch into the furnace.

• DMPA Asbestos Program Will Aid Production

DMPA's new program for asbestos purchasing in Arizona should go a long way toward stimulating production in the Globe district. Some years ago, the U. S. Bureau of Mines (after spending nearly \$200,000 on exploration work) reported the area to be of dubious merit. Operators of asbestos properties, however, refuted the bureau's report by actual accomplishment, and have produced the bulk of the iron-free, long fibre, spinning grades mined in the United States. Now they really can "go to town." Still, the prices which GSA will pay are by no means comparable with the going prices for similar material in South Africa.

• Beryl Expansion Is Authorized

Beryl still remains on the "hot" list with DMEA and DMPA. As a result, DPA has authorized an expansion

Helpful Technical Bulletins for Mill Men



From time to time when new Cyanamid Reagents are developed, when new applications for older reagents are made, and when data accumulates on separation processes for mineral dressing and coal preparation, Cyanamid's Mineral Dressing Laboratory publishes "Mineral Dressing Notes." Issues available include:

- #6 —Cyanidation of Concentrates
- #9 —New Depressants for Carbonaceous Gangue in Flotation Pulp
- #14 —Heavy-Media Separation Processes
- #15 —Flotation Reagents
- #16D—Dutch State Mines Cyclone Separator Processes
- #17 —Chemistry of Cyanidation
- #18 —Coal Preparation

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AMERICAN

Cyanamid
COMPANY

MINERAL DRESSING DIVISION
30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK

of 4,200 short tons of ore per year. The Small Defense Plants Corporation has announced that it will finance 50 per cent of this expansion program.

• Record Output of Aluminum

The aluminum industry is pointing with pride to the new production record established in 1952. On the basis of actual figures for the first 11 months of the year, total output in the United States in 1952 is estimated at 1,860,000,000 pounds. Expansion projects already under way are expected to increase production in 1953 to 2,500,000,000 pounds and to about 3,000,000,000 in 1954.

Copper producers, however, do not view the growth of the aluminum industry with the same enthusiasm. They feel that the aluminum expansion, much of which is the direct result of government stimulation and assistance, is a threat to future copper markets.

• Copper Controls To Continue

The government has denied the copper industry's request that price ceilings on domestic copper be increased or done away with. The rejection was announced by Economic Stabilizer DiSalle who said it has been decided by the Office of Price Stabilization and had the concurrence of Defense Mobilizer Henry H. Fowler.

"In view of the continuing critical shortage of this basic defense material, suspension of ceilings is out of the question," DiSalle said. "And in view of the favorable current earnings position of the industry, no increase in ceiling prices is justified." He also predicted that an increase in supplies should become available shortly after the first of the year.

A different explanation of the copper shortage was given by Roger W. Straus, chairman of the board of directors of American Smelting and Refining Company. He pointed out, in a year-end review of the metal industry, that the continuing critical copper shortage is in large part attributed to the existence of multiple price ceilings on domestic copper, while copper of foreign origin is free of control.

"This metal has continued in short supply due to an inadequate flow of scrap and the very heavy demand for copper arising from the rearmament program," he said. "If domestic ceilings were lifted it is believed that scrap would flow freely and the shortage would end provided none of the usual sources of supply were materially curtailed because of strikes or other force majeure events."

COMING CONVENTIONS

February 12, 13 and 14, 1953. Mining Conclave and Convention, COLORADO MINING ASSOCIATION, Shirley Savoy Hotel, Denver, Colorado.

February 16 through 19, 1953. Annual meeting, AIME, Statler Hotel, Los Angeles, California.

March 23 through 27, 1953. Eighth WESTERN METAL EXPOSITION and WESTERN METAL MINING CONGRESS, Pan-Pacific Auditorium and Statler Hotel, Los Angeles, California.

March 31 through April 2, 1953. FIRST INTERNATIONAL MAGNESIUM EXPOSITION, Washington, D. C.

April 9, 10, and 11, 1953. LEAD INDUSTRIES ASSOCIATION, Silver Anniversary convention, Greenbrier, White Sulphur Springs, West Virginia.

April and May 1953. FIFTH EMPIRE MINING AND METALLURGICAL CONGRESS. Opening session at Melbourne, Australia April 20, followed by extensive tours.

July 13 to 16, 1953. Fiftieth anniversary meeting IDAHO MINING ASSOCIATION, Sun Valley, Idaho.



INTERNATIONAL PANORAMA



MORRISVILLE, PENNSYLVANIA—United States Steel Corporation has produced the first steel at its new Fairless Works. Capacity of this newest United States Steel plant will be 1,200,000 annual tons.

YELLOWKNIFE, NORTHWEST TERRITORY—During 1952, average grade of ore treated by Consolidated Discovery Yellowknife Mines, Ltd. was 1.12 ounces gold per ton. November ore averaged 1.33 ounces; highest in the mine's history.

COPENHAGEN, DENMARK—The Nordic Mining Company has been formed to mine lead in East Greenland. Control is by a Danish company with the Swedish firms—Boliden Gruvaktiebolag and Stora Kopparbergs Bergslags Aktiebolag owning a minority interest. The Canadian firm of Inbush Limited also has an interest.

JACKSONVILLE, FLORIDA—The National Lead Company has acquired a large area of Florida beach sands adjacent to its Jacksonville ilmenite-rutile-zircon-monazite dredging operations.

ADELAIDE, AUSTRALIA—The South Australian Department of Mines is now operating its uranium mill 24 hours per day at Radium Hill.

COXTON, PENNSYLVANIA—The first pilot plant for recovery of ferromanganese from open-hearth, steel furnace slag is under construction here by Mangaslag, Inc. Initial capacity will be about 1,000 long tons of ferromanganese a month.

TORONTO—Sherritt Gordon Mines Ltd. has received an additional \$1,000,000 payment from Newmont Mining Corporation for convertible debentures to help finance the Lynn Lake nickel mine and refining facilities.

MUFULIRA, NORTHERN RHODESIA—Mufulira Copper Mines Ltd. has produced its first electrolytic copper at its new electrolytic plant here. Present plant capacity is 3,000 tons of copper per month but the plant will have a 6,000 ton capacity when finished.

MANCHESTER, JAMAICA—Alumina Jamaica Limited has started production of alumina at its new 120-ton-per-day plant here.

BOMBAY—The International Bank for Reconstruction and Development has loaned \$31,500,000 to the Indian Iron & Steel Company, Ltd. for expansion of its West Bengal Works. Annual blast furnace capacity will be more than doubled to 1,500,000 ingot tons.

SYDNEY, AUSTRALIA—National Lead Company's subsidiary, Titanium Alloy Manufacturing Company, has secured a prospecting permit covering 575 miles in the Cloncurry district, Queensland.

DULUTH, MINNESOTA—Iron ore production in the United States during September set a new monthly record when 15,912,165 gross tons were produced.

THE DALLAS, OREGON—Harvey Machine Company has received a rapid tax amortization certificate from the Defense Production Administration for \$62,250,000 to build an aluminum plant here. Annual capacity will be 54,000 annual tons of aluminum. First output is scheduled in late 1954.

RIDDLE, OREGON—Hanna Coal and Ore Corporation has received a certificate of necessity for five-year amortization of 70 percent of the \$22,000,000 cost of a new ferro-nickel smelting plant here.

LIMA, PERU—The Northern Peru Mining Company (ASARCO) subsidiary has completed exploration drilling at the Toquepala porphyry copper deposit. Plans are underway to bring the deposit into production. It will probably rank as the eighth largest copper mine in the world.

BOMBAY—Plans have been made for the construction of a steel plant in India to be jointly owned by the Indian and Japanese governments. Annual capacity is planned at 400,000 ingot tons.

CLEVELAND—Great Lakes shipments of iron ore during 1953 are scheduled to be 106,000,000 tons. Loss of 55 shipping days due to the steel strike reduced 1952 Lake shipments to 74,910,798 tons.

SANTIAGO—The Central Bank of Chile sold 238,500 tons of copper to world consumers at a price of 35.50 cents per pound f.a.s. Antofagasta during 1952.

HENDERSON, NEVADA—Air shipments of titanium metal are being made from the plant of Titanium Metals Corporation of America to Allegheny Ludlum Steel Corporation's rolling plant at Watervliet, New York.

WASHINGTON—The Defense Production Administration has revised its cobalt goal for 1955 upward to 27,000,000 pounds—a 6,000,000-pound increase over the goal set last May.

CRIPPLE CREEK, COLORADO—For the first time in several years, a Cripple Creek gold mine—the Ajax—was the largest gold mine in Colorado during 1952.

SUPERIOR, ARIZONA—The San Manuel Copper Corporation has received two certificates of necessity permitting a five-year tax write off at 40 to 75 percent of \$71,228,500 worth of copper and molybdenum producing facilities.

SALT LAKE CITY, UTAH—Production of copper in Utah during 1952—283,500 short tons—was the greatest in 10 years. Utah continued to be the second largest copper producing state and also was second in gold and silver output.

RIO DE JANEIRO, BRAZIL—Industria e Comercio de Minerias, S. A. in which Bethlehem Steel Corporation holds an interest has received a \$67,500,000 loan from the Export-Import Bank to finance manganese production in Amapa Territory. Production of manganese is scheduled to start in 1956 with the DMPA buying most of the output.

CLIMAX, COLORADO—The Defense Production Administration has raised its molybdenum expansion goal to 70,000,000 pounds production in 1954. The old goal set on January 4, 1952 was 58,000,000 for 1954.

Utah Construction Sends Mining Staff to Korea

The first phase of the management-type contract that the Utah Construction Company has with the Republic of Korea has been started. The contract calls for rehabilitation of Korean tungsten mines and mills.

Utah has hired and sent to Korea a group of experts who will make an on-the-job survey and submit a requirements report to Utah management in the United States. The report will contain data on existing conditions and equipment, together with recommendations as to what types and amounts of equipment from the United States are needed to increase tungsten output from the Sangdong and Dalsung mines. Sangdong is one of the world's major scheelite mines and its ores also contain an appreciable amount of bismuth.

Heading the group of tungsten experts is David Baker, well-known tungsten metallurgist with experience at United States Vanadium Corporation's Pine Creek, California scheelite flotation plant, and as superintendent of Metals Reserve Company's tungsten refinery at Salt Lake City, Utah, during World War II. He has recently been manager of Fresno Mining Company's California tungsten mines and mills. J. A. Mecia, former assistant manager of the Bradley Mining Company's operations at Yellowpine, Idaho, will also be a key man. T. B. Laird, a regular Utah Construction Company man, has been assigned to the project, and Wayne M. Glade will be office manager in Korea.

Other western engineers employed for the project are Robert James McRae, Stibnite, Idaho, formerly employed as metallurgist at the Yellow Pine operations; O. A. McGinley of Stibnite, Idaho; Leonard Cecil Clark, San Francisco, California, former chief engineer at Yellow Pine; A. S. Kastinos, Leadville, Colorado; Lloyd H. Thompson, Henderson, Nevada; and Dale Clifton Mathews of Monticello, Utah.

Australia Copper Project Proposed To Kennecott

New South Wales Minister for Mines J. Arthur has asked the Kennecott Copper Corporation to invest in mining Cobar copper deposits, where geological exploration has indicated over 11,000,000 tons of average grade, 1.6 percent copper and 11 dwts. of gold per ton in the field. Mr. Arthur interviewed Kennecott's president, Charles Cox, on a recent trip to New York, but the results of the interview are not known.

The New Occidental Coal Mines No Liability, which has drilled for copper and gold in the Cobar area to depths of 2,000 feet, is reportedly prepared to sell to the United States company or to accept a share issue in a new company without requiring a cash consideration for such shares.



The mill operated at Humboldt, Arizona by the Iron King Division of the Shattuck Denn Mining Company produces three marketable concentrates from a fine-grained, abrasive, schistose sulfide ore carrying values in lead, zinc, gold, and silver. Extremely fine grinding (nearly 70 percent of the flotation feed passes 325 mesh) is required to liberate valuable minerals from gangue. Close quality control is systematically maintained to insure maintenance of the very critical optimum operating conditions.

IRON KING USES CLOSE CONTROL

Lead-zinc ore from Shattuck Denn's Iron King mine in Arizona precludes high recovery and requires close control for optimum mill performance

Milling capacity at Arizona's Iron King, a property near Humboldt owned by the Shattuck Denn Mining Corporation, has kept pace with the steadily expanding Iron King mine

production and the operation now ranks as one of the West's most important lead-zinc producers. Plant operations are directed by H. F. "Hap" Mills, manager of Shattuck

Denn's Iron King division, and A. L. Pessin, mill superintendent.

A problem in economics

Development of an economically successful flowsheet to concentrate the hard, abrasive, fine-grained Iron King sulfide ore has not been easy. Years of experience were necessary before the three differential flotation products could be profitably produced. The problem is still one of economics rather than one of precise metallurgical practice, and extremely close cost control is maintained at all times.

The point of optimum recovery—recovery to include the purity of concentrates—is more critical than common in the treatment of less intractable ore.

Gold and silver account for a large part of revenue. Silver is in tennantite $[(Cu, Fe)_{12}As_4S_{13}]$ and presents no special problem. Mill heads are 50 percent pyrite, all of the gold is in the pyrite, and in order to re-

Shattuck Denn's Iron King mill is under the direct supervision of mill superintendent A. L. Pessin.



cover a substantial part of the gold-bearing pyrite in the lead concentrate it is necessary to make a lead concentrate containing about 25 percent iron which limits the lead to about 30 percent. Though part of the zinc is a light-colored sphalerite which floats readily, a large part is magnetite (high-iron), limiting the grade of zinc concentrate to about 50 percent. Gold reporting in the zinc concentrate is directly related to the iron content.

Daily control by reports

The measure of the overall performance of the mill is economic recovery which is the ratio of net smelter dollars to recoverable value and is a weighted average of metal recovery and grade of concentrate for the four metals. The recoverable value of the ore is the value of ore after freight and treatment charges, if all of the gold, silver, and lead were recovered in a 30 percent lead concentrate and if all of the zinc were recovered in a 50 percent zinc concentrate. Each shift's results are recorded on a shift report which shows the lead economy, the zinc economy, and the overall mill economic recovery. These reports are combined into a detailed daily mill report.

Iron King mill heads average 2.36 percent lead, 6.44 percent zinc, 0.165 percent copper, 0.13 ounce in gold, and 3.78 ounces in silver. These figures represent contained metal; actual recovery as represented by smelter returns is considerably less.

Crude ore is fed from a 100-ton bin on the present Iron King main headframe directly to the primary crushing plant by a 24-inch belt con-

veyor. A coarse fraction, separated from the minus-three-inch material by a 3½- by 9-foot vibrating grizzly feeder, is crushed in a 15- by 30-inch Buchanan jaw crusher. Both the fine and the crushed fractions are combined and carried to a 3- by 8-foot Telsmith vibrating screen on an 18-inch belt conveyor that has a Dings magnetic head pulley to remove tramp iron. Coarse screen product is first crushed by a 3-foot Symons shorthead cone, then combined with the fines, and finally conveyed to one of four fine ore bins. Three of these bins hold 250 tons each and the fourth, 600 tons; all are fed with a tripper carried by an 18-inch belt conveyor.

Fine grind needed but difficult

Material is discharged from the small bins by Syntron vibrating feeders to a Marcy 77 ball mill operated in closed circuit with a 5- by 24-foot Door FX classifier. The ore stream from the 600-ton bin is split and fed to two Marcy 75 ball mills in closed circuit with two Dorr duplex classifiers—one 6 by 21 feet, the other 8 by 25 feet. As the fine ore is fed to the ball mills, 0.7 pound per ton of Aero Brand cyanide, 1.3 pounds per ton of $ZnSO_4 \cdot 5H_2O$, and 0.05 pounds per ton of "404" are added to condition the pulp for subsequent flotation.

The extreme hardness and abrasiveness of the ore makes difficult the fine grind necessary to liberate the valuable constituents. Nearly 2.50 pounds of 4-inch steel balls are required per dry ton of mill feed. The optimum grind produces a classifier overflow in which about 70

Flotation cells on the left are the Fagergren zinc roughers and those on the right are Denver no. 24's used as zinc cleaners.

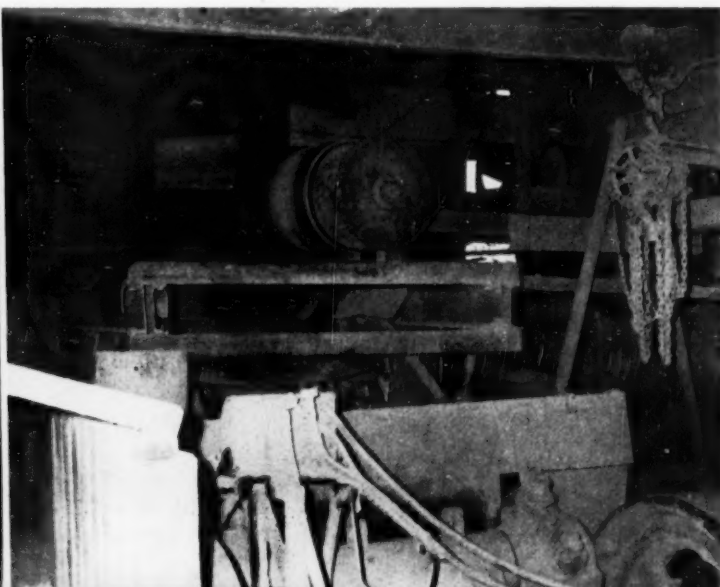
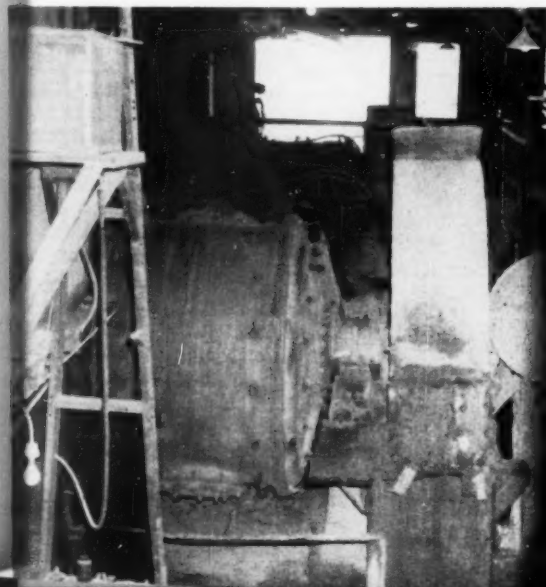
percent of the solids pass 325 mesh. Ground product is treated in two separate lead flotation circuits.

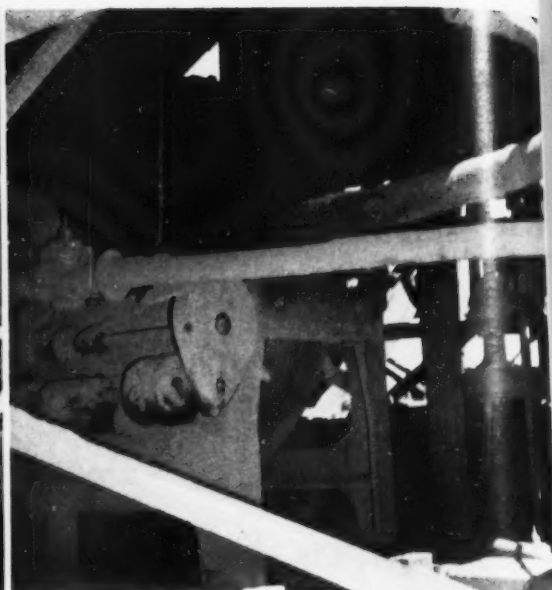
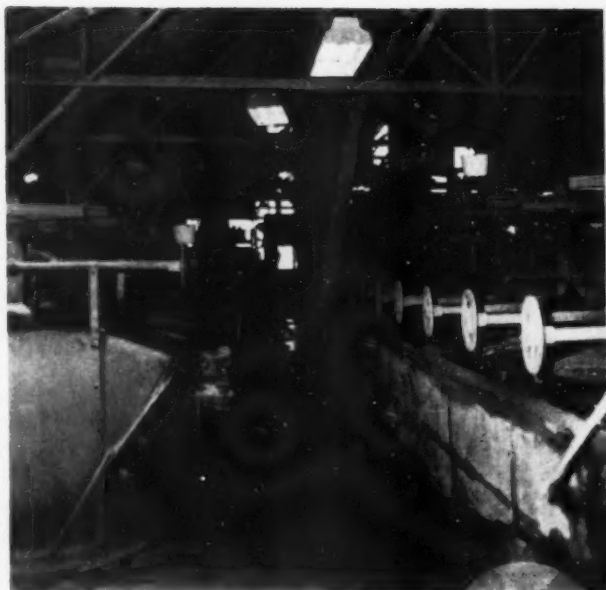
Two lead circuits

Classifier overflow from the two units operating with the Marcy 75's is conditioned with Z-3 and cresylic acid and is Wilfley-pumped to the third cell in a Denver flotation machine made up of ten No. 21 cells. This and the following seven cells make up the lead rougher section. Concentrate from the roughers is fed to the first two cells, used as cleaner units.

Overflow from the classifier operating with the Marcy 77 mill is conditioned with cresylic acid and Z-3

LEFT: Three ball mills—one Marcy 77 and two Marcy 75's in closed circuit with three Dorr classifiers—grind Iron King's hard, abrasive ore to produce classifier slimes, nearly 70 percent of which pass 325 mesh. RIGHT: A vibrating grizzly feeds coarse ore from a chain-driven conveyor to the primary jaw crusher. The conveyor leads from a bin on the main headframe. A secondary bin (seen in the background) was built to handle custom ore brought to the Iron King mill but is now seldom used.





LEFT: Flotation sections at the Iron King mill produce three concentrates—lead, zinc, and gold- and silver-bearing iron. The two sections shown here are the two separate lead circuits made up of Denver cells. RIGHT: Dewatering with an American disc filter is the final step in processing Iron King's lead concentrate.

and pumped by a Wilfley unit to the third flotation cell in a string of six Denver No. 21's and two Denver No. 24's. Product from the final six of these cells is cleaned by the first two.

Lead concentrates combined

Concentrates from the two separate lead sections are combined and dewatered in a 20-foot Dorcco thickener and a 6-foot, two-disc American filter. The final lead concentrate, shipped to American Smelting and Refining Company's El Paso, Texas smelter, has an average dry assay of

22.5 percent lead, 8.3 percent zinc, 1.08 percent copper, 30.49 ounces of silver, and 0.87 ounce of gold.

Low lead content in the concentrate is a result of metallurgical problems. Any attempt to raise the lead content results in rapidly lowered recovery; even with the fineness of grind achieved, the minerals are not completely liberated and gangue, zinc, and iron minerals carry lead values into the tailings from the two lead circuits. High zinc content in the lead concentrate is permitted because lowering the per-

centage of zinc results in a loss of gold and silver values to the zinc concentrate, where they are paid for at a lower rate.

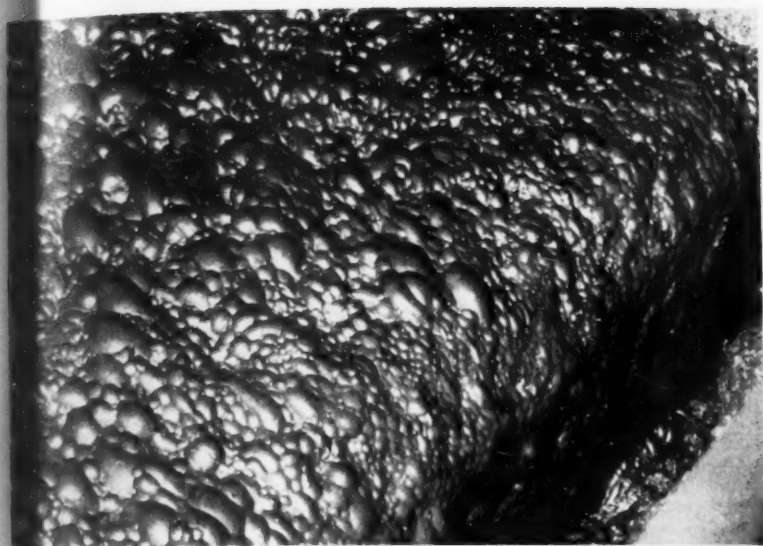
Tailings from the two lead circuits are combined and transferred by a 6- by 6-inch Denver SRL (see rubber-lined) pump to a 40-foot Dorcco thickener. Overflow from the thickener is used as make-up water in the grinding section. The thickened pulp goes to two 8- by 8-foot conditioners where 1.3 pounds of copper sulphate and 1.3 pounds of hydrated lime are added per dry ton of feed.

Fine circuit

A Wilfley pump moves conditioned pulp to the first of fourteen 56-inch Fagergren cells forming the zinc rougher section. In the rougher machine, Z-3 is added at the fourth, seventh, and thirteenth cells. Concentrate from the first three of the cells goes to the first cell in a zinc cleaner circuit composed of nine Denver No. 24 cells. Concentrate from the third, fourth, and fifth rougher cells feeds the fourth cleaner cell; concentrate from the seventh through the tenth cells forms the feed for the fifth cleaner cell; and concentrate from the thirteenth and fourteenth rougher cells is introduced at the eighth cleaner cell. Product from the fourth, fifth, sixth, and seventh cleaner cells is fed back to the second cleaner cell and concentrate from the eighth and ninth is fed to the sixth. Tailing from the cleaner section goes back to the

Iron King tailing is thickened in a 40-foot Denver unit before being sent to the tailing basin shown in the background.





Lead concentrates, carried by the froth produced in two separate flotation sections, are the first of the three types of concentrates to be removed from the pulp processed in Iron King's mill. These two concentrates are combined before dewatering and shipped as a single marketable product.

second conditioner ahead of the zinc circuit for retreatment.

Special Dryer for Zinc

Final zinc concentrate is produced by the first three cleaner cells and is dewatered by a 20-foot Sweco thickener, a 6-foot, three-disc Eimco filter, and a dryer. Because the zinc minerals grind to greater fineness than those of lead and iron, dewatering is more difficult and filter product from the zinc unit must be processed in a dryer to eliminate excess water, reducing freight charges. Assays on the dry weight of zinc concentrate average 50.4 percent zinc, 2.7 percent lead, 0.37 percent copper, 0.11 ounce in gold, and 6.79 ounces in silver.

Iron carries gold and silver

Tailing from the zinc roughers is transferred by a 5- by 5-inch Denver SRL pump to a seven-cell iron flotation section made up of five 48-inch Massec and two 56-inch Fagergren units. Cresylic acid and Z-3 are added ahead of this section. The pulp stream is split and introduced at both the second and third cells of the section. Concentrate from the third, fourth, and fifth cells goes to the second, and product from the final two cells feeds the first. Final iron concentrate, produced by the first and second cells, is pumped by a Wilfley unit to a 6-foot, three-disc Eimco filter for dewatering. Average assays of the iron concentrate run

circuit as launder spray in the zinc flotation section.

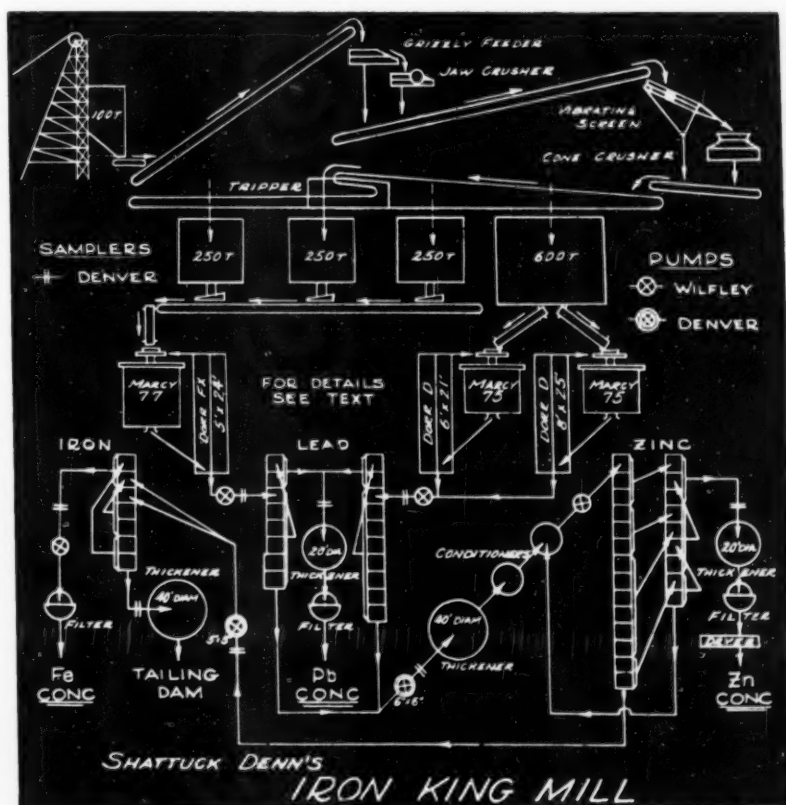
Control by close sampling

Data for the close quality control required in the mill results from assays of samples gathered by eight automatic Denver samplers. Two of these sample the heads by cutting the circuit ahead of the lead flotation section—one sampler for each of the two lead machines. The others sample lead concentrate, combined lead tailings (feed for the zinc section), zinc concentrate, zinc tailing (feed for the iron section), iron concentrate, and iron tailing (final plant tailing).

Iron concentrate is shipped to American Smelting and Refining Company's El Paso, Texas smelter, and the zinc concentrate is treated at ASARCO's Amarillo plant.

Overall recovery in the Iron King mill is admittedly low in comparison with many similar plants. In this case, however, experience has shown that this low recovery is actually the most profitable attainable under present operating costs. The sharp increases in cost-to-profit ratios at the Iron King, caused by the least deviation from optimum operating conditions, point up the necessity for close and systematic quality control, a factor often neglected in most mills.

0.16 ounces gold, 2.35 ounces silver, 1.00 percent lead, 4.00 percent zinc, and 37.5 percent iron. Iron tailing—the final plant tailing—is dewatered in a 40-foot Denver thickener and sent to Iron King's tailing pond. Thickener overflow returns to the





Water and a soft clay bottom gave trouble for rubber-tired shuttle cars before a peripheral drainage system was worked out.

Equipment Used To Mechanize Winn Mine:

Drilling

Holman SL9 percussion drills
Chicago Pneumatic 327-C-700

Mining Haulage

3 60D shuttle cars
2 T2 trucks
2 42 D shuttle cars

Jumbos

3 Joy Hydro-Drill
2 Ingersoll-Rand DJB

Shuttle Car to Main Line Loading

2 PL11-17 elevators
Conway Model 8 loader (rebuilt)

Pumping

3 Mather & Platt "pluro-vane" pumps
1 Beresford submersible in 18-inch bore hole

Main Line Haulage

2 50hp. Diesel locomotives
2 75hp. Ruston Diesel

Loading in Stopes

1 18HR1 Joy
2 18HR2 Joy

Development Loading

Eimco 21 Rockersho

HOW ENGLISH MINE EXPANDS OUTPUT

The Santon Mining Company overcomes difficulties imposed by a wet mine, a soft clay floor, a badly fissured back, and an irregular deposit to perfect a trackless mining method using American and British equipment

By G. V. Standerline*

Manager, Santon Mining Company
Scunthorpe, Lincolnshire

Mechanization and development of a trackless system of mining iron ore have enabled the Santon Mining Company Ltd. to operate one of the world's most efficient underground mines despite the great difficulties imposed by an adverse series of natural conditions. The company is mining the stratified, low dip, ferruginous limestone known as the Frodingham ironstone in North Lincolnshire, England.

Geology and Mineralogy

Near the base of the Lower Lias, the ironstone has a six-mile-long, North to South outcrop and dips to the east at an average of 1 in 50. For two miles from the outcrop, the

surface also dips slightly, making a very large area for open-pit mining. As a result, some open-pit mines still have only about 30 feet of overburden. However, this overburden is largely loose clay with some blown sand above it, and hence it has a very flat angle of repose. This is an important point when the overburden exceeds a thickness of 50 feet. Most of this shallow strippable area has now been mined, but fortunately the bed continues without fundamental change in quality or thickness. It is 32 feet thick in the center and thins to about 10 feet at the margins, though at the southern end the bed is considerably interlaced with clay and sulphur bands.

Chemically, it averages about 22 percent iron. However, it contains about 28 percent limestone, and 10 percent silica and alumina. Most of the limestone is in the bottom half of the deposit and formerly the bottom was left *in situ* to produce a self-fluxing mixture. Now, however, all the bed is mined, siliceous iron-

stone from Northamptonshire (inferior oolite) is railed 75 to 100 miles, and the two ores produce a self-fluxing mixture in the blast furnace.

Metallurgy

The very low iron content of the ore caused severe problems for two groups of people. Those who were mining the ironstone had to do so very cheaply, but difficulties were met and production continued to increase. The blast furnace metallurgist had bulk handling problems and needed large blast furnaces to get reasonable tonnages of iron. The changes in ore meant many analyses and burden changes to give a reasonable silica sulphur balance, until, recently, bedding systems were introduced.

Open Pitting

The introduction of bigger and better excavators kept pace with the slight cover increase, but facing the open-pit miners to the east is

* Bachelor of Engineering in Mining (Sheffield University), associate member of the British Institute of Mining Engineers and the British Institute of Mining and Metallurgy, Diploma of Metallurgy (Imperial College, London).

Mining Experience To Date Indicates:

TRACKLESS MINING has more than doubled the output per man shift.

HIGH CAPITAL INVESTMENT in equipment necessary to achieve high tonnages per shift is only justified for a dry floor and dry ironstone.

PERIPHERAL DRAINAGE of the mining areas is best achieved by driving headings with track-mounted loaders loading into mine cars.

COMPRESSED-AIR DRY ROTARY DRILLING is a success. Penetration speeds of 8 feet per minute have been reached.

PREVENTIVE MAINTENANCE is a "must." A completely reliable grease monkey must do nothing but lubricate equipment.

DIESEL LOCOMOTIVES are reliable for main line and auxiliary haulage. They necessitate good ventilation, at least 112.5 cubic feet per minute per locomotive brake horse power in the Dieselized areas.

SECOND STAGE EXTRACTION is possible during advance or retreat permitting underground stockpiling of thousands of tons of broken ore which can be loaded as needed and independent of drilling.

UNDERGROUND CONTOUR maps are essential for planning.



About 12 feet of ironstone is back stoped behind development to facilitate ore blending for the blast furnace metallurgists. This system also permits stockpiling of thousands of tons of broken ore underground.

the Lincolnshire Edge, a steep escarpment which suddenly increases the amount of overburden from above 65 to over 120 feet.

Early Underground History

It became obvious in the early 1930's that sooner or later underground mining would be necessary, and as long ago as 1935 plans were made accordingly. The directors of the Frodingham Ironstone Mines Ltd. (now The Santon Mining Company Ltd.) were the first to actually do anything. In 1937, an experimental mine was started into an open-pit mine face. Data was obtained on explosives, roof span, pillar size, longwall methods, caving, etc., and then a start was made in April 1938 on the first production mine. Winn's ironstone mine came into being, as hereinafter described.

Simultaneously, an adit, having a cross section 12 by 10 feet was driven from an old open-pit face and a shaft was sunk from the top of the hill. From the outset, it was realized that a high degree of mechanization would be essential, and so plans were made accordingly. From the start, the adit, rising at 1 in 100 for the first 150 yards to protect the portal, was driven with hand-held Holman SL9 percussive wet drills, using an upper drag cut. Broken rock was loaded with an American, Conway Model 60 loader, into 2½-ton mine cars, with haulage by 50-hp. Diesel locomotives.

Progress was good, in spite of the fact that large quantities of water inflowed.

Shaft sinking began in June 1938. The shaft is a three-compartment rectangular one, and sinking was made possible by the use of a tubular steel headgear which was later lifted bodily out of the way and the permanent headgear erected. (See accompanying picture.) Large quantities of water were encountered on striking the ironstone at a depth of 130 feet, and cementation was necessary to sink through its 32-foot thickness. It should be noted that, apart from a nucleus of experienced Cumberland iron-ore miners, local inexperienced labor was used and trained in the work of both sinking and mining. The shaft was sunk to a total depth of 208.5 feet and completed in April 1939. Thereafter, a four-compartment pumping chamber was built in the clay below the ironstone and three completely automatic pumps were installed. These were Mather & Platt "Plurovane" pumps, one with a capacity of 300 gallons per minute and two with 500 each; all were fitted with Evershed "No-Flote" electrodes and "Seaborne" interceptors and have given excellent service. The mine in flow is now around 650 gallons per minute.

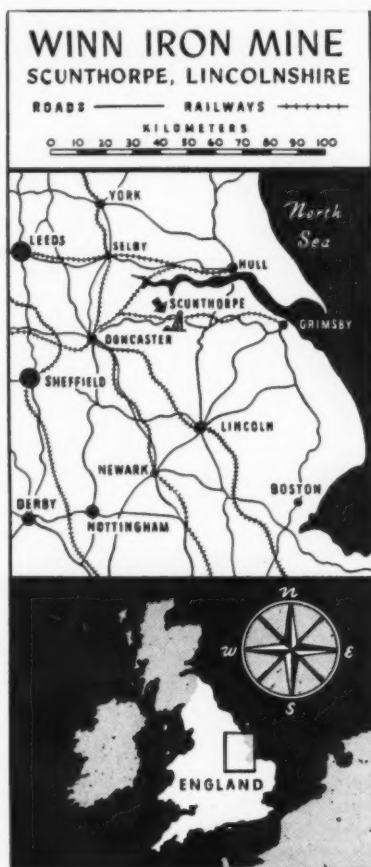
Work continued both on the surface and underground. The permanent steel headgear, 70 feet high to the sheave wheel center line, was

erected, and a 200-hp. AC hoist operating at 660 volts was installed. Underground, an automatic rotary dumper was built, feeding two 6-ton skip-measuring pockets. Finger gates and doors on bunkers and pockets were fitted with Westinghouse compressed air controls, which were also fitted to the dumper ram.

After the pit bottom circuit was completed, a start was made in driving the main entries (see plan map). Work continued on these entries with No. 2 entry as the main haulage way, until all work ceased in 1943. This was because the men, except for a small safety crew, were transferred elsewhere by orders of the Ministry of Labour as a war emergency measure. Thus, the mine was idle until the middle of 1948, when a few men were recruited (most of the trained local men did not come back), and work was resumed. Twenty-four European volunteer workers were sent to the mine in November 1948, and so, a real start was made.

Trackless Mining

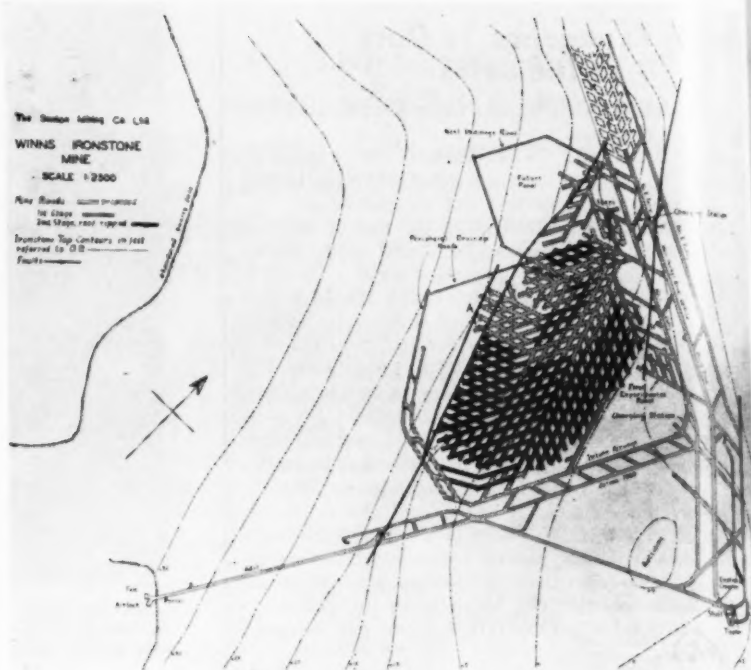
The directors of the company had arrived at the conclusion that modernization should take place and that trackless mining for main production should be the system. Accordingly, an order was placed in 1948 for an 18HR1 Joy loader, the first shipped from the United States to England. This order was fol-



lowed with others for two 18HR2 Joy loaders, three 60D rock model shuttle cars, two PL11-17 rock elevators, two T2 trucks, three Joy Hydro-Drill jib booms, two Ingersoll Rand DJB booms, and two Joy F113 spotting hoists.

Temporarily, two second-hand ex-National (British) Coal Board 5 SC coal model shuttle cars were bought. The 18HR1 arrived in January 1949 and immediately went into action, loading mine cars. Its first job was the driving of the battery charging station, followed by the driving of two new intake airways. The two 5SC's were installed in April 1949. One Conway 60 was still driving No. 2 entry, and also available was a Joy 20-hp. scraper loader. The latter was not a success and was eventually sold. A hoe-type bucket was necessary to handle the bulky ore. This bucket dug excessively into soft, wet clay floor.

Until early 1950, drilling had been done by Holman SL9 hand drills, using a 20 hole upper drag cut with a 6-foot pull. Heavier machines were tried in a series of tests with a Holman two-drill balanced jumbo with longer rounds. It has since been abandoned as being too unwieldy. The upper drag cut is an



Development and stope plan of the Winn mine.

easy round to put in by hand, but tends to disturb the roof; later, a single wedge cut round was adopted. This uses a 6-hole, vertical, V cut, with a total of 21 holes, including the short center breaker. This is easily drilled from a jumbo.

The 18HR1 gave very little trouble, and in its first 2,000 feet of driving (loading about 22,000 tons) had only one major breakdown when a differential spiral ring gear was smashed. The 5SC cars, however, were a source of concern, and though they had been overhauled before coming to the mine, they obviously would not stand up to rock mining. Wear and tear were considerable, especially with conveyor clutches. These 5SC's are now used as supply cars. The twin air intakes were driven before the arrival of the rock elevators, and in order to get the job started the spar Conway was modified to act as an elevator. To do this, the bucket and table were removed, the back end lashed together with two steel strips 1 1/4 inches thick by 5 feet 6 inches long by 8 inches wide, as shown in the accompanying picture.

Irregularities of Deposit

Two points should be noted here. The first is that since it is a stratified deposit, all development can be in the ironstone, and therefore there are no waste disposal problems. Secondly, the part played by

tectonics must be appreciated. The complexity and multiplicity of lensing in the bed caused trouble.

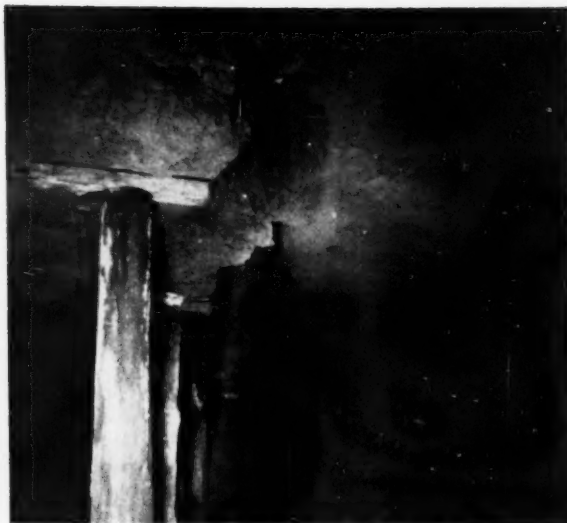
The first intakes were driving from two fixed points in the stratum, and had, throughout, a very uneven floor. Sudden changes from one lens to another, probably a lens of hard limestone to one of much softer ironstone, caused steps in the floor. These, combined with the fact that a considerable amount of water was struck, gave difficult floor conditions. The roof always needed watching. Probably with a good limestone back for a hundred feet or more, another round might produce an open fracture in the roof, which had to be supported. With two headings, this caused production delays. However, the 18HR1 was usually waiting for the drillers and an average of 200 to 250 tons per shift were loaded. These intakes were finished in September 1949, and a start was made on the first production panel. Soon after, the two 19HR2 loaders arrived.

Experimental Mining

Shortly before starting this panel, the first T2 truck arrived, fitted with three HDJ booms. One was removed, and Holman SL200 wet percussive drills were fitted. Thus, for the first production panel, there was an 18HR1 loader, three 60D cars, one drillrig, and one PL 11-17 elevator. Access roads to this panel



G. V. Standerline, Winn mine manager, stands beside the modified Conway loader. Shuttle cars discharge their loads to the Conway for elevating to the main line haulage cars shown in the background.



Fissures, such as the one shown, and a roof which deteriorates after exposure to air complicated early mining.

had been graded so that a start was made with a floor 10 feet above the base of the ironstone. The idea was to develop diamond-shaped pillars on 55-foot centers with haulage roads 15 feet wide (limited by Coal Mines Act Support Rules) in this section. Later, it was intended to break the bottom 10 feet and load it out separately. The main advantage of this method was that the roof could be supported, where necessary, once and for all.

A number of difficulties were en-

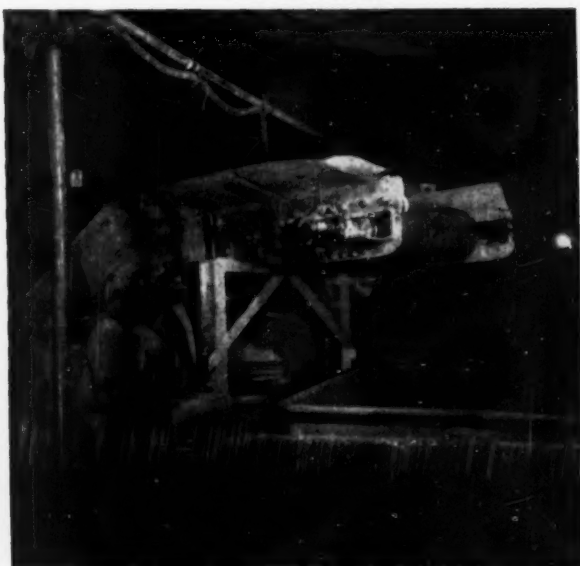


→ This 42D shuttle car has been redesigned and rebuilt to give an 18-inch ground clearance. It carries about 8 tons of ironstone.

Roof bolting is now used in fissured ground and has been a complete success.



Main line haulage is by Diesel-drawn cars which are loaded by this elevator which has been converted from a Conway loader. Shuttle cars feed the elevator.



countered, however, as listed below:

1. Lens changes meant that roads rarely holed into each other at the same level. Hence grading of the floor and roof gave high places sometimes dangerously near the roof clay.

2. Fissures were more pronounced in this upper section, and while some roof was good when first exposed, it deteriorated later. In other words, while theoretically it was better practice to take the top section first, it was not easy in fact to always know what to do with this section.

3. Ruts, as in the intakes, caused trouble to shuttle cars.

Reverse Mining Cycle

Conditions did not improve, and it was decided to reverse the procedure and to try mining the bottom first. A fault which brought No. 1 entry level with the basal clay was an aiding factor. The first panel was abandoned and panel two started mining bottom first. A remarkable improvement was immediately seen, though fresh problems arose. For this panel, a new plan was adopted, using a 3½ Pillar Key-Room plan (later altered to a 5 pillar one). This was an improvement, and results

were quite good. New problems were:

1. Drilling. On the whole, the stratum at the start was fairly dry, but water was being used for drilling, and it found its way into the clay floor. Though most of the percussive drilling was new, and experiments with electric rotary drilling had not given much encouragement, a complete change over to dry compressed air rotary drilling was made and was, at that time, surprisingly and completely successful. Later, nine 5-foot rounds per shift were achieved with one Jumbo using Chicago Pneumatic 327-C-700 drills.

2. Quality. The bottom section of the ironstone is, as has already been stated, relatively high in lime and low in iron. This did not suit the metallurgists so the higher middle section, about 12 feet of ironstone, was back-stoped and dropped on to the roads behind development headings in the bottom zone; this created a second production unit. By means of a few horizontal lightly charged holes, it was easy to stock-pile underground. Drilling and loading were independent of each other, and, with little or no equipment transfer, an 18HR2 and two 60D

cars could easily load 600 tons per shift.

After the Key Room had been advanced about 400 feet, water in the stratum was struck, and a turn was made to the left of this panel. Dry again, things went well until water was struck again. It had become obvious that mere down dip drainage affected by No. 3 entry was not enough. This meant the expensive step of blocking out areas, and the seriousness of the position was accentuated by the fact that output would have to be restricted. At first, drainage drifts were started with the trackless equipment (a picture gives some idea of the floor conditions), and the company did keep going with a struggle. Soon, however, a compressed-air-operated Eimco 21 Rockershoovel arrived and the encirclement drainage scheme started, driving drifts 8 by 8 feet in section. Complete success was achieved by this scheme, and production units now have an excellent dry floor.

Equipment Modifications

For a long time the 18HR2's gave no trouble, but lately some difficulty has been experienced with excessive wear of the worms and wheels of the gathering arm speed reducers. The hydraulic system has been altered by using the buffer beam as an oil reservoir. The 60D's have given excellent service, but the conveyor drive has been lifted to stop the base plate catching on the ground. The T2 trucks have had their deck turned over to give a greater ground clearance, and the small spotting hoists have been replaced by larger 13½-hp. Austin-Hopkinson "Pickrose" hoists. Two new Diesel locomotives have been purchased, one being the first Ruston 75-hp. Mark "L.H.U." model which can be driven from both ends.

Roof Bolting

Roof bolting is now extensively used in fissured ground, using Rawl-plus K19/20, 1-inch-diameter shields, and bolts of varying lengths up to 5 feet. Complete success has been achieved by making sure that the shield finishes in really hard ground. Tests have been carried out, the first of their type in the United Kingdom, using a hydraulic withdrawal jack, and one bolt remained firmly anchored at over a 13-ton pull.

Dry Rotary Drilling

The company has recently perfected a method of dry drilling

(Continued on page 76)

The all-steel headframe at the Winn mine was erected in 1937 when this photograph was taken.



CANADIANS USE NEW METHODS

Canadian Exploration Limited, operating in southeastern British Columbia, is successfully applying trackless equipment to both mining and drifting

One of the world's most active mining districts straddles the Canada-United States border where northeastern Washington meets southeastern British Columbia. Through the expansion of existing properties and the development of previously unworked deposits, the district between Metaline Falls, Washington and Nelson, British Columbia is rapidly becoming an outstanding producer of lead, zinc, and tungsten.

Of the many companies now active in this area, Canadian Exploration Limited, operating just north of the border, near Salmo, British Columbia, is an outstanding example. Though by no means the largest company operating there, it has become an epitome of the entire district by combining fevered activity with technological courage in solving the problems met in both tungsten and lead-zinc mining and milling.

Production from its two previously developed conventional mines will soon be supplemented by output from additional developments using the most modern methods of mechanized underground mining. Largely unprecedented in western North America and certainly unique in the Dominion, Canadian Exploration's experiments in the latest trackless methods and equipment are resulting in important additions to engineering experience and indicate the development of a new technology for metal mining in the Pacific states and provinces.

Varied History

The properties now worked by Canadian Exploration were first explored, for gold, early in this century. Though commercial quantities of gold were not found, lead and zinc deposits were discovered that yielded a small but steady output from 1907 to 1925. During this period, the productive areas were worked from the Emerald mine. Two other nearby mineralized zones, the Jersey and the Dodger, were explored but never exploited. A small mill, later destroyed by fire, was built on the property in 1919.

After nearly 15 years of inactive



Harold Lakes of Nelson, British Columbia, is general manager of Canadian Exploration Limited.

ity, the original owners, Iron Mountain Limited, resumed exploration of the three ore zones and began limited development under the direction of Harold Lakes of Nelson, British Columbia. In 1942 scheelite was identified in old prospect workings west of the original Emerald mine. Exploration of the tungsten-bearing zone proved successful and

development of the property, purchased by the Canadian government and named the Emerald Tungsten Project, was immediately accelerated by the Dominion's Wartime Metals Corporation under the direction of E. E. Mason. Tungsten, one of modern industry's most important alloying metals, was in critically short supply during these war years because of curtailed foreign shipments. Projects such as the Emerald, potentially important though not economically competitive with foreign mines, were governmentally developed to provide the production needed to replace the then inaccessible foreign supplies.

The new Emerald tungsten mine (as opposed to the original Emerald, a lead producer) was developed and the Consolidated Mining and Smelting Company of Canada, Ltd. built, under government contract, a 300-ton concentrator and a 6,000-foot aerial tramline leading to it from the mine portal. (See *Mining World*, July 1944.)

Recent Activities

The property was again inactive until 1947, when it was purchased

Staff members W. C. Tuomi, W. F. Atkins, and Jim Eastman (shown here), working under the direction of D. A. Gordon, have been instrumental in carrying out Canadian Exploration's experimental program of trackless drifting.





Engineer Jim Eastman stands near a section of the skarn (tungsten-bearing) zone showing the folding, faulting, and metamorphism prevalent in Canadian Exploration's ore zones.

from the government by Canadian Exploration Limited. Before the end of that year production was resumed and reached 260 tons per day. Exploration at the Emerald was also resumed and later expanded to include the Jersey zone. By late 1948 considerable tonnages of lead-zinc ore were blocked out in the Jersey.

Because of the extent of these deposits and the low price of tungsten at that time, the company decided to change over to lead-zinc production. Operations at the Emerald were stopped and the Jersey was opened on two levels by adits, one in and one beneath the ore. The Emerald

mill, renamed the Jersey, was converted and expanded to handle 500 daily tons of lead-zinc ore. Because tramline bottlenecks were possible, and because truck haulage was already required from the main Jersey portal to the head of the tram, a haul road was built directly from the mine to the mill. Again, however, international events changed the course of development.

With the start of the Korean war, important tungsten shipments from China to Free World nations stopped—a situation worsened by the increased demands for tungsten in the expansion of armament production.

The Emerald mine was still potentially one of the biggest tungsten producers in North America and it was necessary to insure steady output in the event of unfavorable economic developments. For this reason, the Canadian government again stepped in and purchased the remaining Emerald tungsten reserves; Canadian Exploration retained ownership of the ground outside of the reserve blocks. The company was subsequently named by the government as the operating management of the Emerald and built a 250-ton government-financed tungsten concentrator.

The company's continued exploration, stimulated by rising prices, proved the presence of mineable deposits of both tungsten and lead-zinc ore in the undeveloped Dodger zone. During the past two years the company's rate of expansion has been accelerated to include (1) de-

velopment of the Dodger, (2) enlargement of the new Emerald tungsten mill to 500 tons per day, (3) enlargement of the Jersey lead-zinc mill to 1,200 tons, and (4) further development of the Jersey mine. The company is headed by Charles A. Banks of Vancouver, with Harold Lakes of Nelson as general manager.

Replacement and Metamorphism

The recent advancements have been based on geologic information evolved from privately financed and government exploration, from surface and underground diamond drilling, and from extensive development.

The lead-zinc deposits, with the ratio of zinc to lead averaging 4 to 1, are lenticular sulphide replacements near the base of limestone beds several hundred feet thick which have been folded, faulted, and in places altered by contact metamorphism. This alteration formed the underlying siliceous series containing the high-temperature tungsten occurrences, which lay in troughs formed by granite and argillite. The limestone host is stratigraphically inferior to a thick series of black argillite beds.

All orebodies in the four lead-zinc zones worked by Canadian Exploration Limited lay in Iron Mountain, which separates Sheep Creek from Lost Creek. The Jersey lead-zinc mine is on the south slope, the Emerald Tungsten mine is on the west slope, and the Dodger Tungsten mine is on the north and west slopes.

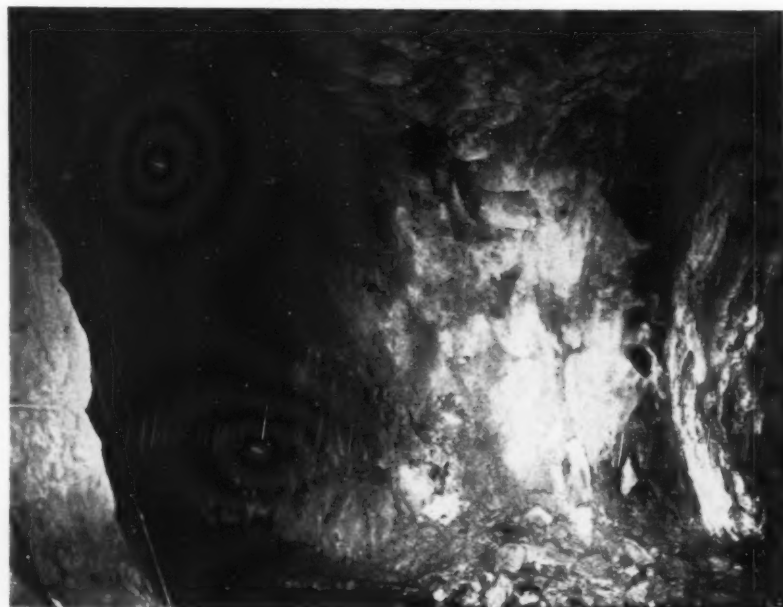
Four lead-zinc ore zones—A, B, C, and D—are worked in the Jersey. Surface diamond drilling indicates continuity from the Jersey to the Dodger over a total length of 7,000 feet. Individual lenses are usually surrounded by an envelope of dolomite and range up to 55 feet in thickness. They occur in the synclines and anticlines of the irregularly folded undulating structure, which has an average plunge of 14 degrees to the south.

In the skarn, underlying the lead-zinc ore zones by as much as 50 to 100 feet, are the Dodger tungsten deposits which, like those in the Emerald tungsten ore zone, occur in a trough formed by granite and argillite with the tungsten found in skarn and silicified limestone. Tungsten here occurs as scheelite (calcium tungstate) in close association with pyrrhotite and pyrite.

The Usual and the Unique

Both the Emerald and the Jersey mines are worked with conventional

Turnouts are cut at 400 to 500-foot intervals to accommodate waiting empty trucks. The ground through which the adits are being driven requires no support, with the exception of a series of timber sets near the portal.



track haulage and open stopes supported by occasional pillars. Broken ore is slushed to draw points feeding to the main haulage level. Stopes as well as development workings use Canadian Copco Ltd. rock drilling equipment; 44-pound Atlas drills, carrying Sandvik Coromant series 4 steels with integral tungsten carbide inserts, are mounted on either Atlas pusher legs of 59-inch feed or Atlas stoper legs of 39-inch feed. Two leg extensions of 23 inches and 43 inches are used to increase the reach of the drills.

Each machine requires 87½ cubic feet of air per minute. Drilling records show an average usage of 700 feet of hole per steel with four sharpenings. Breaking with detonation by millisecond delay caps requires ½ pound of Forcite powder and 1½ feet of drill hole per ton of ore. Production has averaged 12 to 15 tons per man shift underground and about 40 tons per man shift in the stopes.

When development began at the Dodger, the methods of trackless mining (the use in stopes and haulageways of Diesel powered equipment mounted on rubber tires or crawlers) were investigated. Important among the advantages this type of mining offers is the reduced lateral and vertical development required to work thick, undulating deposits of generally shallow dip. For instance, the Dodger orebodies, both tungsten and lead-zinc, as outlined by exploratory drilling were thick and, though dipping only about 7 degrees, had local undulations that



A second type of unit used in Canadian Exploration's experimental program is an Allis-Chalmers HD9 front end loader, shown here on surface clean-up work. These HD9's combine the advantages of low clearance and maneuverability.

would require development for conventional mining on several separate levels. The ability of rubber-tired and crawler-mounted diesel equipment to negotiate slopes up to 20 percent would in this instance allow exploitation from a single level. Other advantages offered by this type of mechanization include greater flexibility in mining and time saved in track laying.

Canadian Exploration's deposits in the Dodger zone, however, were not entirely similar to the orebodies then worked by trackless methods in other districts. In other words, an

experimental program was required to gain the experience necessary to choose wisely the equipment for subsequent mining operations. To acquire this knowledge and to avoid the expense of replacing track equipment with trackless, the initial development was begun with equipment to be used later in mining, even though such equipment is perhaps not ideally suited to original development work.

Present Projects

Two adits have been started—the 44 level, to be about 4,200 feet long,

LEFT: The portions of the Jersey deposits now worked by Canadian Exploration use conventional methods of haulage by track equipment. The northern section of the Jersey is being developed for trackless mining. RIGHT: To drill the high (15-foot) Dodger drift faces without benching, a mobile drill platform is mounted on the rear end of a standard crawler tractor. Folding wings give a 13-foot working width when extended.





One of three devices being used in driving development adits at Canadian Exploration Limited's Dodger mine is a Rogers Iron Works' slusher ramp. Though new ramps have now been delivered, the first one to be used was this remodeled unit. Originally designed for low clearance use, the ramp was raised to provide loading height for 10-ton Diesel-powered Dart trucks.

on the north slope of Iron Mountain, and the 42 level, about 2,500 feet long, on the west slope. The two, when completed, will connect at right angles beneath the main section of the "A" orebody and will follow as closely as practicable the lower contact of the skarn zone. A pilot drift has preceded the long 44 adit to insure its proper location in relation to the ore horizons.

Three methods of loading the broken rock have been used in advancing these adits, each affecting to some extent the driving method. End-dump Dart trucks with 6.3-yard boxes and 100-hp. Cummins Diesel engines are used throughout for haulage. The three types of loaders used with these trucks are Eimco 104 over-head muckers, Allis-Chalmers HD9 front-end loaders, and Rogers Iron Works mobile scraper ramps.

When the work was started, the smallest cross-section that would accommodate the trucks and the three types of loaders was chosen as a standard round. The section decided upon was 15 feet high and 14 feet wide—determined by the overhead clearance required for the Eimco mucker and the lateral clearance required for the trucks.

Where Eimco muckers are used, turn-outs are cut every 400 to 500 feet to accommodate the waiting empty trucks. With HD9 loaders, passing points at 50 to 75-foot intervals are also required to allow the loader to discharge by backing into truck driven under the bucket.

If HD9 loaders were used exclusively, this additional breakage for passing points would be largely offset, since only 11-foot clearance is needed to load the Darts with an HD9. Experience has shown that the front-end loaders are most efficiently used where the face is carried wide enough to allow the loader to turn completely around. The additional breakage in this case would be offset by a much faster loading cycle.

Variations on a Method

Drilling, breaking, and hauling are essentially the same for both of the above loading methods. An 8-foot, 49-hole, vertical V-cut round is drilled with five Atlas airleg drills carrying Coromant insert steels. Two of these drills are used on a platform 10 feet long and 8 feet wide, mounted 7½ feet high on the rear end of a Diesel-powered bulldozer; folding wings increase the deck width to 13 feet when extended. The other three drills are used on the floor of the heading beneath the platform. An International TD14 carries the mobile platform in the Dodger 42, and a Caterpillar D7 is used in the Dodger 44. Drilling patterns are arranged to give equal footage to each of the five machines.

When loading with either an HD9 or an Eimco 104, three 8-foot rounds are taken in two shifts by a standard cycle of drill, blast, ventilate, and muck out. The seven-man crew used in each method consists of five miners, one loader operator, and a crew leader. During the mucking pe-

riod two miners drive truck and the other three wet down, scale the back and face, and hand muck the broken rock inaccessible to the loader. The loader operator services the loader and handles the portable drill platform during the drilling cycle.

Seventy percent Driftite stick powder is loaded without spacers or stemming, lightly tamped, and blasted with standard delay electric caps activated by 220-volt alternating current. Millisecond detonators have been tried but, though fragmentation was better, muck was thrown too far from the face.

With the third loading method—the Rogers mobile scraper ramp—the methods of drilling and breaking are considerably changed. Because the scraper ramp lacks maneuverability, it cannot be moved quickly to a turnout for passage of the drilling platform. Therefore, though the method is still experimental and subject to change, a bench is formed at the face to provide two drilling levels. After the blast, the bench is cleared off first. Drilling then starts on this level while the lower face is being mucked out. At first both faces were blasted together, but because mucking both levels on each round slowed overall advance, the lower face is now drilled with 16-foot steel and blasted every other round. Though many obvious disadvantages are evident in scraper loading from a single heading, an advance of from 14 to 16 feet per shift is expected when the cycle is more nearly perfected. Since more space at the working face will be available, future stoping with scrapers will undoubtedly obviate much of the interference between drilling and mucking cycles now encountered in the adits.

Precautionary Ventilation

Landis exhaust conditioners are used on all Diesel-powered equipment. These double-chambered scrubbers pass the exhaust through water, through a layer of emersed calcite lumps, and through a layer of emersed copper wool before discharging to the mine atmosphere. Soluble gases, including much of the aldehydes and the acid gases, are dissolved and neutralized. Though little of the carbon monoxide is removed, the amount of this gas contained in Diesel exhaust is slight and can be most easily controlled by ventilation. Since a certain amount of irritating aldehydes remain in the cooled and scrubbed exhaust, concentrations of fumes are obvious and could rarely reach harmful proportions before becoming objectionable.



A fleet of 10-ton Diesel-powered Dart trucks equipped with Landis exhaust conditioners are used in hauling broken rock and ore from Canadian Exploration's development headings. These same units will be used later in trackless mining.

As a further precaution, Canadian Exploration has a program of preventive maintenance that includes (1) daily inspection of conditioners and engines to insure efficient operation, (2) frequent carbon monoxide checks on all exhausts, and (3) fuel inspection to guard against contamination by gasoline, small amounts of which can dangerously increase monoxide concentrations.

Dodger Mining

Since the present Dodger workings are in the tungsten-bearing skarn below the lead-zinc zone, only tungsten ore has been produced and then only where it is encountered on the adit level. Development and not production is now of first importance. When stoping begins, the experimental nature of Dodger operations will continue to test the efficiency of various drilling and breaking methods—hydrojibs long-hole diamond drills, long-shell or pneumatic mounts on front-end loaders, etc. Initial stoping will exploit the tungsten deposits with subsequent development of the higher lead-zinc horizon.

The Jersey Future

A third adit, known as the Jersey 42, has been driven (from the west slope of Iron Mountain south of the Dodger 42) by trackless equipment to open the north end of the Jersey zone for trackless mining. Present conventional mining in the Jersey will not be discontinued, however, since the parts of the Jersey ore-bodies now being mined are already developed by the conventional workings. The additional development required for trackless mining would

not be warranted. A single system of ventilation will be common to both the trackless and conventional sections of the Jersey. A 6 by 8-foot ventilation raise at 45 degrees, designed for a capacity of 100,000 cubic feet of air per minute, has been driven at the north end of the present Jersey workings to service both sections.

An underground crushing plant using an Allis Chalmers 36 by 48-inch primary jaw crusher in closed circuit with double deck screens and an Allis Chalmers hydrocone secondary crusher will be installed in an underground chamber 800 feet from the portal of the 3800 level main

cross-cut of the Emerald Tungsten mine. This plant will handle both tungsten and lead-zinc ore as required from either the 2,500-ton tungsten coarse ore storage pocket or the 5,000-ton lead-zinc coarse ore storage pocket located above the crushing chamber.

Crushed ore will be carried to the surface by a 24-inch belt conveyor running along the back of the 3800 cross-cut and will be distributed either directly to the tungsten mill by a short belt or, by a series of conveyor belts and ore passes, 6,100 feet to the lead-zinc mill.

Run of the mine ore, both tungsten and lead-zinc, is trucked to a surface dumping point adjacent to the Dodger 4200 portal and bypassed either to the tungsten or to the lead-zinc underground coarse ore storage pocket.

In conclusion, it should be pointed out that, though Canadian Exploration is not the only company in this area operating trackless Diesel equipment underground (two companies with holdings near Metaline Falls, Washington have somewhat similar programs), its experiments with a variety of methods and equipment will add significantly to western mining technology. Mechanization as applied to underground mining is an important factor in cost reduction and operational flexibility. Successful pioneering in this field will certainly result in one possible step for western producers toward combating rising costs and falling metal prices.

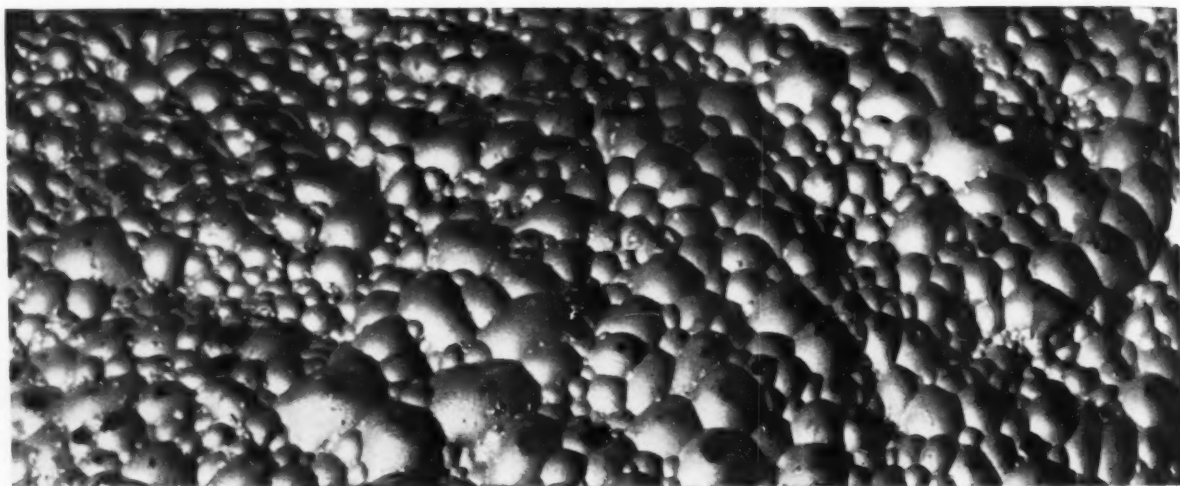
The third type of machine Canadian Exploration uses in loading is Eimco's 104 mucking machine. With the 104, little lateral clearance is required during loading.





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MINING WORLD



LEFT: The Champion mine headframe. The shaft collar is at the right. Hoisting cables from the hoist, out of sight, at the right pass over the sheaves on the left and then to the main sheaves at the top of the head frame. RIGHT: A Dumptor is used to build stockpiles of ore. To the right, a load of minus- $\frac{3}{4}$ -inch ore has been added to the pile. The minus-3-inch, plus- $\frac{3}{4}$ -inch stockpile is at the left.

DRILLING IMPROVEMENTS MAKE CHAMPION IRON MINE OPERATIONS ECONOMICALLY FEASIBLE AGAIN

After almost 40 years of inactivity, the Champion mine at Champion, Michigan, is once more producing high-grade (over 60 percent natural iron) hard, specular hematite ore from the Marquette Range.

Today, with approximately 50 miners working two eight-hour shifts five days a week, 1952 production was 176,786 gross tons. Comparing present production at this mine with that of 60 years ago, the advantages of modern machinery and mechanized mining methods are well-illustrated. In 1882, 400 miners were required working two 10-hour shifts six days a week to produce the same annual tonnage.

Mine Reopened In 1948

This mine is owned by the Oliver Iron Mining Company and is operated under lease by the North Range Mining Company of Negaunee, Michigan. North Range began pumping operations to reopen the mine in January 1948. In December

of the same year, the bottom of the shaft was reached after removing about 600,000,000 gallons of water. Today, comparatively little pumping is required as during winter months the entire inflow amounts to only 50 gpm.

Great Strides in Drilling

In the words of F. R. Werther, superintendent, "The great strides taken in perfecting drilling equipment since 1930 are perhaps the major factors in making the operation of the Champion mine once more economically feasible."

The old piston drills used in the Champion mine many years ago drilled an average of only one inch of hole per minute. These drills required two-inch diameter steel to start a hole, and frequent changes, finishing with $1\frac{1}{4}$ -inch steel. Today, the light weight, Ingersoll-Rand J 50, hand-held drills mounted on air legs and using carbide insert-tipped steel require only two changes to drill an eight-foot-deep hole. The

starter is four feet long with a $1\frac{3}{8}$ -inch bit, and the second is eight feet long with an $1\frac{1}{16}$ -inch bit. Present drilling speed averages 14 inches per minute.

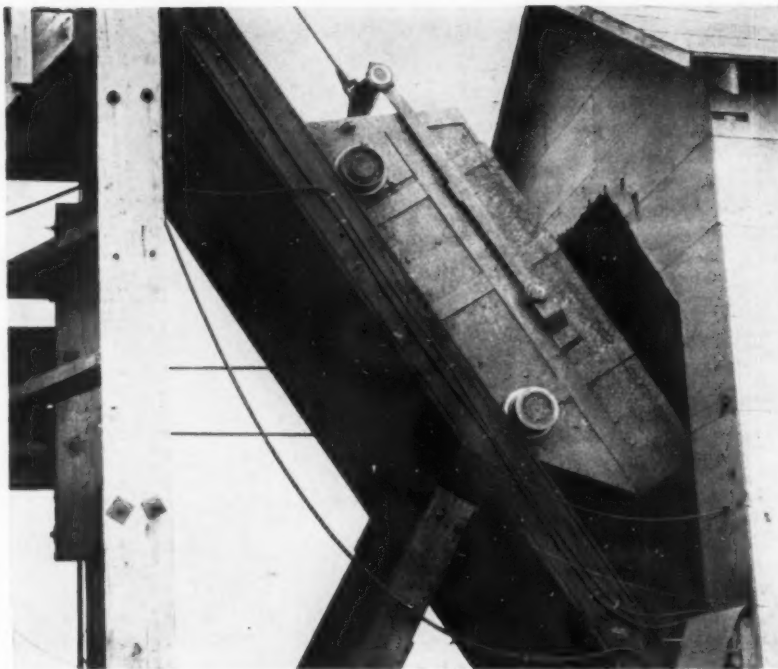
Another important factor in the smaller holes is the faster loading of less powder per hole. Blasting is done by Hercules dynamite fired by DuPont, milli-second delay electric blasting caps.

Mechanized Trimming

In place of hand trimming of ore from the stopes to the shaft, today's motive power consists of four, Mancha, storage-battery-powered, locomotives, each pulling one $3\frac{1}{2}$ -ton-capacity car operating on four levels. Former operators loaded ore into cars by hand, while today it is loaded by Sullivan three-drum electrically driven three-drum slusher hoists.

Many Angled Incline

In the early days the shaft was sunk as ore was depleted at the ex-



One of the two 3½-ton skips used for hoisting ore.

isting level. The result is a curious main shaft that inclines first at 70°, then 62°, then 72°, next vertically, with the last 200 feet of the vertical shaft rotating in an azimuth of 44° to the west. The final section of shaft is sunk at an angle of 54°.

Two 3½-ton-capacity skips are used to hoist the ore from the 2,500-foot-deep mine. A skip hoisted from the bottom of the mine, 33rd level, travels about 2,700 feet. At each

change of angle in the shaft, the hoisting cable is guided by one or two sheaves.

Two Sizes of Ore Shipped

In the head frame that was erected by North Range, ore from the skips is fed to a 4- by 12-foot, double deck, Hewitt-Robins Gyrex vibrating screen. The top deck is a scalping unit with rods spaced three inches apart. The lower deck is

fitted with ¾-inch mesh screen. Oversize from the top deck is chuted to a 24- by 36-inch Farrall Bacon jaw crusher set at six inches. Oversize from the second deck drops to the crusher-discharge bin. The plus-¾-inch, minus-6-inch ore is shipped as open hearth lump to U. S. Steel Corporation's steel mills in the Pittsburgh, Pennsylvania district. The minus-¾-inch ore is shipped to the Corporation's South Chicago, Illinois, steel plant. Both sizes of ore are shipped the entire distance to the steel plants by railroad. Winter stockpiling of the two sizes of ore is done by a Koehring Dumptor.

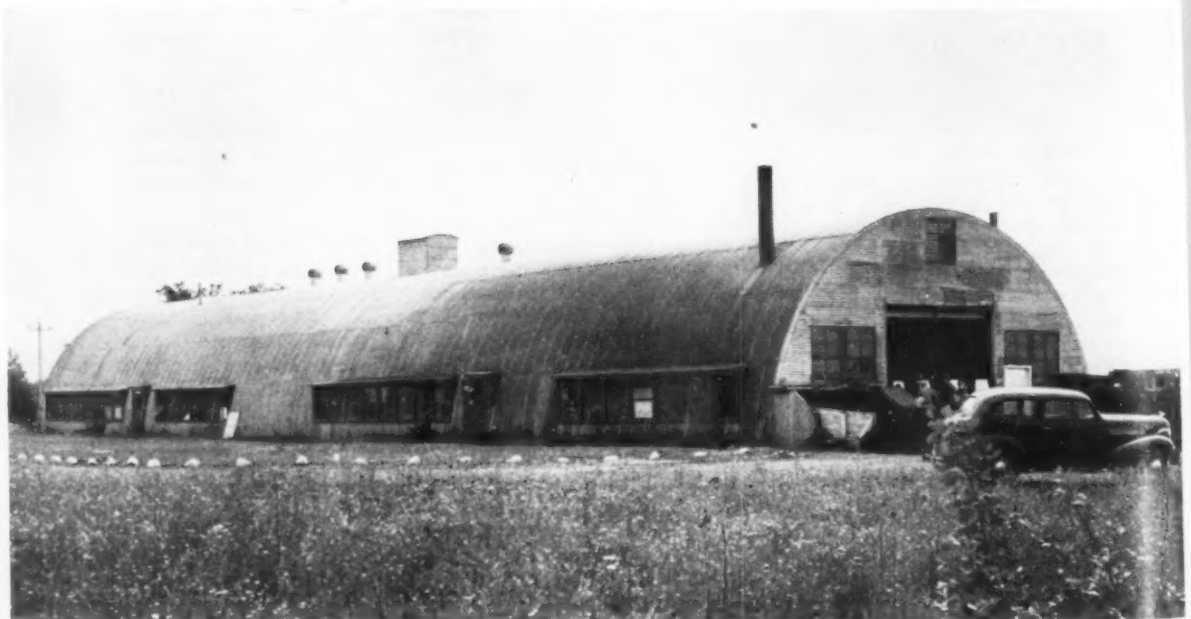
Quonset Building

The hoist, air compressors, miners dry, office, warehouse, and machine shop are all housed in the same steel Quonset building. An unusual feature is the location of the building on the hanging wall side of the shaft. This necessitates an extra set of sheaves at the foot of the head-frame to direct the hoisting cables to the hoist drums.

Other North Range Mines

R. S. Archibald is president of North Range Mining Company. Other operations conducted by this company include: Blueberry mine, near Ishpeming; Book mine, Alpha, and Warner mine, Amasa. All three are on Michigan's Upper Peninsula; the first on the Marquette range and the last two on the Menominee range.

Corrugated steel Quonset building housing the dry, hoist, compressor, office, warehouse, and machine shop.



STUDY SHOWS THAT BAUXITE, GOLD, SILVER, AND ALLOY METALS PAY HIGHEST TAX RATES

By John E. Kelly
Consultant in Natural Resources
Washington 5, D. C.



John E. Kelly

The mining industry has long been interested in taxation and many plans and suggestions, largely on Federal level, have been made regarding the general need for tax revisions. As a service to the mining industry and to the state mining associations, MINING WORLD has requested that Mr. Kelly prepare this article to show specifically what the tax load is for several key ores and minerals. The study is broken down to show what the respective tax burdens are on the federal, state, and local levels. It is hoped that this study will form the basis for a realistic program for fair and equitable taxation of mining operations.—Ed.

In a long poker game, kitty is the big winner, taking a bite from every pot, risking nothing. As raw materials move from mine, well, or field to refinery or smelter, the tax collector nibbles constantly. Every drilling program is slowed by tax-

tion; mucking machines are burdened with taxes as well as with ore. Taxes weight the dragline, clog the conveyor. The collector shares the miner's lunch. When laying out tipples or booster stations, designers must reckon with taxes second only to friction—with tax loss as well as line loss in electrical transmission.

Studies have been made of extent and multiplicity of taxation of some items of consumer wear or use. Thus it is reported that en route from the cotton field to the retail counter, John Jones' shirt acquires 102 taxes; his gasoline is taxed 100 separate times between well and filling station. It is more commonly known that over 40 percent of the

average retail price of cigarettes represents taxation. When the prevailing domestic charge was \$0.15 per pack, American cigarettes, tax free, sold in Bermuda and overseas PXs at \$0.09.

First Taxation Study

Finding no published figures of taxation upon representative domestic raw materials from their points of separation to their primary reduction or conversion, the writer sought the cooperation of the Bureau of Labor Statistics, U. S. Department of Labor. It was promptly and cheerfully forthcoming. The tables herewith and similar ones for which space is lacking were compiled by the Bureau's Division of Inter-Industry Economics. While the tabulation is new, the basic data stems necessarily from the latest general assembly of industrial statistics, the Census of Manufactures, 1947. Information was obtained also from the Bureau of Agricultural Economics, Interstate Commerce Commission, U. S. Bureau of Mines, other agencies and private sources.

The tax load shown herein has been increased by new taxes and

Table No. II
Estimated Federal, State, and Local Taxes for Selected Raw Materials Industries*

Taxes	Iron Ore	Copper Ore	Lead, zinc Ore	Gold, Silver Ferro Alloys	Bituminous Coal	Sulphur	Bauxite	TOTALS
Total Federal, state, and local taxes	\$38,782,000	\$19,680,000	\$12,678,000	\$12,266,000	\$173,564,000	\$8,917,000	\$1,975,000	\$267,862,000
Total federal taxes	15,032,000	11,501,000	8,171,000	4,211,000	135,394,000	1,799,000	823,000	176,931,000
Direct allocations	14,573,000	11,193,000	7,903,000	3,961,000	133,553,000	1,772,000	798,000	173,753,000
Marginal allocations	459,000	308,000	268,000	250,000	1,841,000	27,000	25,000	3,178,000
Transportation excise	73,000	90,000	70,000	33,000	200,000	4,000		470,000
Excise on material purchases	229,000	181,000	168,000	138,000	1,228,000	12,000	14,000	1,970,000
Excise on non-material purchases	157,000	37,000	30,000	79,000	413,000	11,000	11,000	738,000
Total state, and local	23,750,000	8,179,000	4,507,000	8,055,000	38,170,000	7,118,000	1,152,000	90,931,000
Direct allocations	23,705,000	8,142,000	4,486,000	7,999,000	37,909,000	7,118,000	1,146,000	90,505,000
Marginal allocations	45,000	37,000	21,000	56,000	261,000		6,000	426,000
Excise on material purchases	43,000	37,000	21,000	55,000	256,000		6,000	418,000
Excise on non-material purchases	2,000			1,000	5,000			8,000
State and local taxes as a percentage of estimated taxes paid	61.2	40.9	35.6	65.7	22.0	79.8	58.3	33.9

* Source: Bureau of Labor Statistics, Division of Interindustry Economics. January 1953.

Table No. I
Summary of Production Costs and Identifiable Taxes of Selected Domestic Minerals

Raw Material	Total Inputs to Primary Industry *	Total Taxation**	Percentage of Taxation
Iron ore	\$323,941,000	\$38,782,000	11.97
Copper ore	291,951,000	19,680,000	6.74
Lead, Zinc	165,836,000	12,678,000	7.64
Au, Ag, alloys	77,804,000	12,266,000	15.77
Bauxite	8,474,000	1,975,000	23.31
Bitum. coal	2,623,395,000	173,564,000	6.62
Sulphur	85,200,000	8,917,000	10.46
Totals	\$3,576,601,000	\$267,862,000	7.49

* Domestic ore only. Production costs f.o.b. mine or quarry.
** Tax categories shown in Table No. II.

higher taxes levied since 1947. Figures used are preliminary, subject to minor correction upon checking. Finally, it was not possible to segregate many of the taxes accruing to the extraction and transportation of the raw materials subjects of this study from their respective phase expense. They may appear as undivided and unidentified parts of working costs, but, like the overcoat in the salesman's expense account, they're there.

Study Covers Nine Ores

As compiled by the Bureau of Labor Statistics, the studies covered nine ores and minerals: Iron, bauxite, copper, lead and zinc, sulphur, bituminous coal, gold-silver and ferro-alloys jointly, anthracite coal, petroleum and natural gas. The latter two have been omitted herein. The tables show input (production costs) and related taxes per mineral, and, in greater detail, the nature of such costs for iron and copper ores and bituminous coal mining. These three products have been selected as representative of different types of mining, as well as of geographical distribution. Iron min-

ing is largely open-pit work with the largest workings concentrated along the northern border of the United States. Copper mining is

Table No. II B
Division of Production and Excise Taxes Between Federal and Local Imports

Raw Material	Total Taxation	Taxes—	
		Federal percent	State, Local percent
Iron ore	\$ 38,782,000	38.8	61.2
Copper ore	19,680,000	59.1	40.9
Lead, Zinc ore	12,678,000	64.4	35.6
Au-Ag-alloy ores	12,266,000	34.3	65.7
Bauxite	1,975,000	41.7	58.3
Bitum. Coal	173,564,000	78.0	22.0
Sulphur ore	8,917,000	20.2	79.8
	\$267,862,000	66.1	33.9

with rare exception composed of very large-scale operations, located in the Western States. Coal centers in the South and East, developments ranging from hundreds of tiny pick and shovel "wagon" mines to mechanized giants employing thousands of workers. Coal's problems—its marketing, much of its technology and jargon—differ markedly from the remainder of the industry of

which it forms so important a part

Taxes' Part Of Cost

Table No. I herewith gives a summary of production costs, with their corresponding identifiable taxes, for the seven selected domestic minerals. The overall percentage of taxation—7.49 percent of the production cost—may seem moderate compared to percentages levied upon net income, but if regarded as a severance tax it is seen in its true proportion. Within the average are wide swings between the individual minerals. The largest producer, bituminous coal mining, with total annual input exceeding \$2,600,000,000 pays identifiable production (pre-income) taxes at the rate of 6.62 percent. This figure is in itself an average for the production levy upon coal mines varies with the state and county of operation, the size, nature, and degree of mechanization of each mine. A much newer and smaller segment of the industry, bauxite mining, groans under excise and related levies totalling nearly four times the rate assessed coal, while gold, silver, chrome, and other alloy-ore miners pay over double the average.

Federal-State Ratios

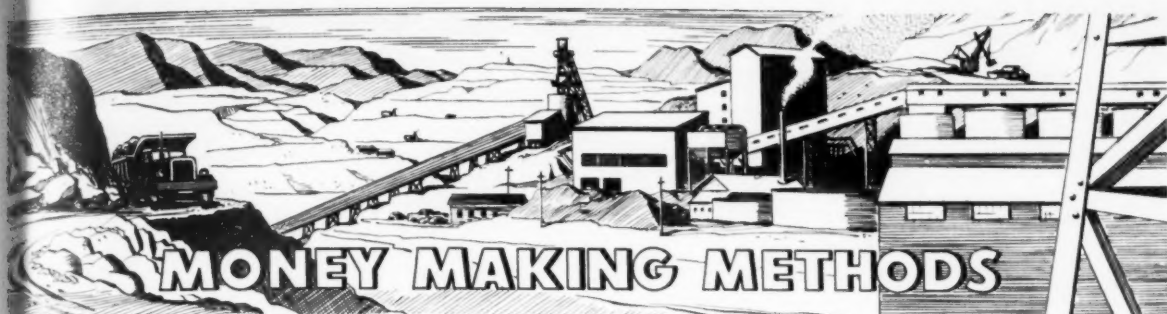
Reference to Table No. IIB indicates that while Uncle Sam levies an average of two-thirds of all taxation, local taxes are usually the cause of the wide variations noted in Table No. I. The federal imposts remain uniform percentage-wise (except in the case of dollar totals of excises deriving from exceptionally long hauls, unusually large purchases of expendable supplies and industries, notably bituminous

(Continued on page 106)

Table No. III
Estimated Production Costs for Iron Ore, Copper Ore, and Bituminous Coal*

	IRON ORE		COPPER ORE		BITUMINOUS COAL	
	Producers' Value	Purchasers' Value	Producers' Value	Purchasers' Value	Producers' Value	Purchasers' Value
Total Input from Table No. I	\$323,941,000	\$323,941,000	\$291,951,000	\$291,951,000	\$2,623,395,000	\$2,623,395,000
A. Cost of materials, supplies, fuel, Etc.	49,305,000	49,305,000	69,782,000	69,782,000	425,900,000	425,900,000
B. Non-material charges	274,636,000	274,636,000	222,169,000	222,169,000	2,197,495,000	2,197,495,000
Breakdown Of Item A:						
1. Cost of materials, supplies, parts	29,831,000	33,687,000	45,305,000	50,247,000	343,242,000	369,237,000
2. Cost of fuel, and electric energy	11,068,000	15,151,000	16,500,000	19,535,000	57,415,000	57,415,000
3. Contract and commission work	467,000	467,000				
4. Marketing charges on materials purchased	7,939,000		7,977,000		25,243,000	
Federal excise taxes	302,000		271,000		1,428,000	
State, and local excise taxes	43,000		37,000		256,000	
Percentage of Taxes to Item No. 4	4.37		3.86		6.67	

* Source: Bureau of Labor Statistics, Division of Interindustry Economics.



SIDNEY SUCCESSFULLY PINS SLABS AND BLOCKY GROUND

The use of rock bolting to replace timber support in certain sections of the Sidney mine of the Sidney Mining Company in Idaho's Coeur d'Alene district has resulted in a substantial cost saving, according to M. C. Brown, general superintendent. Savings in both material costs and labor have been achieved.

In February 1950, the company bolted the back of a new hoist room measuring 45 by 34 feet, and a shaft station measuring 70 by 27 feet. The rock is jointed, blocky, medium thick-bedded slate dipping about 40°. It is fairly hard, provides a good bolt anchor, and normally stands well in small mine openings. Because these openings were unusually wide and the ground unusually blocky, conventional timber or steel sets would have been required if the bolts had not been used.

The shrinkage stopes dip 70°, and because of parallel shearing in the hanging wall, large waste slabs sometimes loosen and fall into the stopes. Many of these slabs have been held successfully by bolting normal to the hanging wall as soon as it showed any tendency to slab off.

The bolts used have been six and seven feet long, of 3/4-inch mild steel, with O-B expansion shells and plugs, and 8 by 8 inch steel plates 3/8-inch thick. Generally the bolts are placed on four-foot centers.

RADIO COMMUNICATION FROM TRANSITMAN-TO-RODMAN

The Florida Phosphate Division of International Minerals and Chemical Corporation is using two portable radio telephones, an industrial application of the familiar "walkie-talkie" of World War II, to speed surveying.

The new equipment is expected to serve a need that has always existed in field survey work. Since much of this work is done in swamps or thickly wooded areas, hand signals between the transitman and rodman are sometimes mistaken.

In order to get an accurate point while determining ownership boundaries of property acquired by the Corporation, quite often the transit and range pole are more than 1,300 feet or about one-quarter of a mile apart.

At such distance, the survey crewmen are still visible to each other, but the hand signals are difficult to understand. Sometimes, a mistaken signal would result in the transitman "taking down" his instrument and wading through a swamp only to find that he had to go back and reset.

With the new radio-telephones, which will operate on the same frequency of other Corporation radio units, not only will such drawbacks be eliminated, but the field surveying crew will be in constant touch with the engineering department through the recently installed radio dispatch unit at the main office.



Radio communication between the transitman and the rodman, barely visible on the far bank, speeds surveying of Florida phosphate land.

The Florida Phosphate Division now has 26 two-way mobile radio sets in cars, trucks, and draglines; three dispatch units (machine shop, office, and truck service); and the main control unit at the electric shop, in addition to the "walkie-talkies."

GROUND CONDITIONS SET FREE STATE SINKING RATES

The eyes of the mining world have been focused on the remarkable shaft sinking operations in the Orange Free State where 34,263 feet of shaft were sunk at 11 developing mines in 1951. The rate of sinking during 1951 varied greatly between various mines due to ground conditions, water inflow etc. Excellent progress was achieved—2,850 feet—at the Loraine No. 1 shaft of the Loraine Gold Mines, Limited. Free State Geduld No. 2 shaft of the Free State Geduld Mines, Ltd., was only sunk 1,081 feet during the same period. The slowness at Free State Geduld was due, in part, to its greater depth, 3,724 feet at the start of 1951, compared to the 301 feet at Loraine No. 1 at the same time. However, underground conditions were the primary differences.

Muriel Sibell Wolle Describes

TURRET AND WHITEHORN

A deceptively good dirt road lures one to start climbing to the two ghost towns of Turret and Whitehorn, high in the mountains east of Salida, Colorado. The first 10 or 12 miles are well-graded and easy driving, but the last few are a challenge to both car and driver. About four miles below Turret the road crosses a meadow and forks—with one branch leading left to Turret and the other climbing around the shoulder of a higher mountain to Whitehorn.

The climb into Turret is over a rough narrow trail, up sharp grades, and around rocky cliffs, until, just beyond a boarded-up schoolhouse, one drops suddenly into the empty camp. One dome-like knob of rocks rises above the rest of the mountain and at the foot of this the town is built. Most of the buildings are lined up along one street, from the Sample Room with its false front and hanging sign at one end of the thoroughfare to the two-story hotel with its balcony and wall-papered interior at the other. Several log cabins are ornamented with carved barge boards—an unusual addition to a log structure.

The town whose boom was short-lived, was platted in 1897 by Robert Denham after the discovery of the

Gold Bug and Vivandiere mines, and reached its peak in 1899 with a population of 500. Charles Robert opened the first store only to be flanked by competitors—a butcher shop and a saloon. The camp was well established by 1898 when a county election was held at which 200 votes were cast. (No city elections were held, however, or city officials appointed except a Marshall.) A bi-weekly stage ran between Turret and Salida, a post office and a second saloon were added to its buildings, and a newspaper, the *Gold Belt*, was published at regular intervals.

The whole town turned out for the Fourth of July celebration in 1900 when United States Senator William Mason of Illinois gave an address; but before the end of that year the mines began to peter out, many of them never having shipped any ore at all. One by one the people drifted away, some to the nearby camps of Whitehorn and Calumet where mining was still active. Not that Turret was deserted but its decline had begun, and even renewed interest during 1901 created by new strikes in the Vivandiere and Jasper mines could not restore it to its peak population. Still, "city lots for business purposes were in demand" and by

1902 a barbershop, a blacksmith shop, a general store, and two hotels, the "Gregory" and the "Turret," were serving its 195 citizens. All supplies were hauled in by four- and six-horse teams and the stage brought mail three times a week from Salida. The Denver and Rio Grande Western Railroad spur to the Calumet iron mine ended four miles from the camp. A log schoolhouse stood on a high knoll above the town and a cemetery crowned a barren hill.

That same year sulphides, whose lowest values were \$100 a ton, were shipped from the Vivandiere by wagon to Buena Vista, 28 miles away. According to the *Denver Times* of June 10, 1901, "Hauling by wagon from Turret with the Calumet spur of the Rio Grande within a few hundred yards of the mine seems singular but the superintendent says he tried for two weeks to get cars put on the spur and finally concluded the railroad company didn't want the freight." By 1904 a \$15,000 milling plant with a daily capacity of 50 tons, was erected 2,000 feet west of the mine. This plant was equipped to treat custom ores as well as those from the Vivandiere.

The Independence, near Whitehorn, was the biggest mine in the district with a vein 16 feet wide producing ore which assayed \$7.00 in gold, \$3.00 in silver, and 15 to 17 percent copper per ton. By 1899 it was shipping ore to Hecla Junction of the railroad by wagon and from there by train to the smelter at Pueblo. It was worked fitfully as late as 1916 when the Turret Copper Mining and Reduction Company shipped from it 100 tons per month of good grade copper and gold ore.

The year 1899 found many mines working. The Jasper, one mile from Turret, with \$76 per ton sulphide ore, employed five men; the Mandate; the Waverly; the Harrison group; "a number of prospects and one shipper in Green Gulch"; and several tunnels, including the Juno and the Mesa, were all busy. By 1900, with 62 properties in operation including the Deer Horn group worked by the Vesper Gold Mining

(Continued on page 105)

All that is left of Turret's main street.



ACTIVITIES OF U. S. MINING MEN

Howard F. Keller, chief of the Base Metals Division of the Defense Minerals Exploration Administration, has resigned to become general superintendent of the Naica unit, The Fresnillo Company, at Naica, Chihuahua, Mexico. Mr. Keller joined DMEA in January 1952, and had held various positions in Mexican and Bolivian mining for 25 years.

Louis Buchman, Kennecott Copper Corporation vice president and general manager of mining operations, has retired from active executive status as of January 1, 1953 after serving Kennecott and its predecessor, the Utah Copper Company, for almost 39 years. Mr. Buchman was the second general superintendent of mines in the history of the Utah Copper Corporation, and his election as vice president and director of Kennecott Copper Corporation in January 1952 was the first such action since the retirement of D. C. Jackling.

William G. Campbell has been named superintendent of engineering and maintenance at United States Steel's American Steel and Wire Division in Duluth, Minnesota. He succeeds William Schuster, who has been transferred to the company's Chicago office.

T. Dan Mortimer, attorney and executive secretary of the Spokane Stock Exchange for the past three years, has resigned to accept an appointment with the Northwest Mining Association in accordance with the latter group's plans to intensify activities "in view of the changed political situation."

Henning Marstrander, U. S. Bureau of Mines mining engineer, has been sent to India for two years as a technical adviser to the Indian government.

V. P. Sonhi, Geological Survey of India, Calcutta, India; W. S. Flynt, superintendent, U. S. Government mica depot, Spruce Pine, North Carolina; Sayed Abdel Naser, Geological Survey of Egypt, Cairo, Egypt; and Dr. J. L. Stucky, State Geologist of North Carolina, recently visited the



LOUIS S. DEITZ, JR. and WESTON G. THOMAS (left and center) recently were appointed to executive positions by the Climax Molybdenum Company, and ALVIN H. ROSS (right) is a new addition to the management of Climax Uranium Company, a subsidiary. Mr. Deitz was engaged as technical advisor to the company because of his long experience and important contributions in producing secondary metals of high purity and developing unique equipment for the production of copper and lead products. He had been associated with Western Electric and its affiliate, Nasau Smelting & Refining Company, for the past 23 years. Mr. Thomas, already a director and treasurer of Climax Molybdenum, has been elected a vice president. Mr. Ross, former research and development metallurgist for Canadian Industries Limited, is now assistant to the vice president and general manager of Climax Uranium. He has been engaged in research, process development, and the refining of radioactive ores for the past fourteen years, except for a brief period during World War II when he was superintendent of a large sulfuric and nitric acid plant.

Spruce Pine, North Carolina district to observe mica mining and processing.

J. F. Wolff, Sr., general mining engineer for the Oliver Iron Mining Division, now is a private consulting mining engineer and geologist with offices in Duluth, Minnesota.

John P. McKee has resigned from his position as assistant chief geologist for the Jones & Laughlin Steel Corporation. Mr. McKee is now associated with R. G. Comer in an independent exploration venture. Mr. Comer was formerly superintendent of the Vicar mine, Gogebic range, Michigan, for the Jones & Laughlin Ore Company.

H. Stuart Harrison, vice president and treasurer of the Cleveland Cliffs Iron Company, has been elected to the board of directors of Jones & Laughlin Steel Corporation. Mr. Harrison succeeds E. B. Greene.

Andrew Fletcher, president of St. Joseph Lead Company, has been elected president of the American Institute of Mining and Metallurgical Engineers. Mr. Fletcher has been treasurer of the association since 1944 and a director for many years. Leo F. Reinartz, vice president in charge of special operating development for Armco Steel Corporation, was named president-elect.

J. S. Kirkpatrick, director of research and development of Brooks and Perkins, Inc., is the new president of the Magnesium Association. W. C. Murray, Utica Radiator Corporation, was elected vice president, and R. D. Taylor, Federated Metals Division of

American Smelting and Refining Company, was elected treasurer.

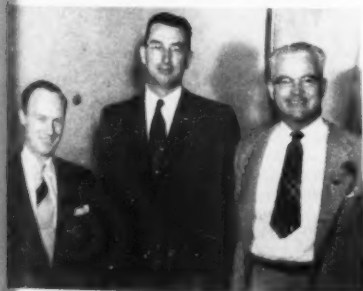
Horace M. Albright, president of the United States Potash Company, Inc., is head of a new citizens' natural resources conservation group called Resources for the Future, Inc. The non-profit corporation will organize and conduct a large conference in Washington, D. C. in March in co-operation with the White House. The group was organized as an advisory board to the Ford Foundation.

Marshall Haney, consulting mining engineer from Takoma Park, Maryland, has been retained by Pittsburgh oil interests to examine properties in Virginia for strategic and critical minerals.

Clyde W. Nicholson, manager of the North Range Mining Company at Ishpeming, Michigan, is chairman of the Upper Peninsula Section of the American Institute of Mining and Metallurgical Engineers. Wayne E. Seppanen, chief engineer for Pickands, Mather & Company in Michigan's Iron River district, has been chosen vice chairman for the coming year.

George P. Krumlauf of Lancaster, Ohio has been appointed metallurgical engineer for the pig iron and coal chemicals sales division of Republic Steel Corporation.

Donald H. McLaughlin, president of the Homestake Mining Company and internationally known geologist, has been elected president of the Mining and Metallurgical Society of America. He succeeds James L. Head of Anaconda Copper Mining Company. Donald M. Liddell was elected vice



HENRY T. MUDD (center) is general chairman of the 175th meeting of the AIME which will be held in Los Angeles February 16 to 21. Shown with him are vice chairman NICHOLAS A. D'ARCY (right) and H. N. APPLETON (left), assistant secretary of the AIME, who helped in making final arrangements for the meetings.

FEBRUARY, 1953

president, succeeding James Douglas. Mr. Liddell was also re-elected secretary-treasurer.

John H. Forbes, foreman at the West Hill mine of Pickands, Mather & Company, has resigned to accept a position with the West Indies Mining Corporation in Puerto Rico.

Parker S. Dunn has been appointed vice president in charge of production for the American Potash & Chemical Corporation. He will be in charge of production and engineering at the Trona, California plant. He succeeds Russell W. Mumford, vice president, who has been appointed consulting engineer in the company's Los Angeles office.

Robert Clevenstine, mining engineer, and George Kubina, rodman, have joined the engineering department of

the Great Northern Railway Company. They will work at GN's iron ore properties in Hibbing, Minnesota.

E. W. Engelmann, assistant general manager of the Utah Copper division, Kennecott Copper Corporation, has been selected as the recipient of the Robert H. Richards award. The award, given by the American Institute of Mining and Metallurgical Engineers, was established in 1947 to recognize "achievement in any form which unmistakably furthers the art of mineral dressing in any of its branches." Mr. Engelmann was cited for his accomplishments in advancing the technique of the metallurgy and beneficiation of copper ores.

Obituaries

Francis A. Bell, 46, vice president of the Cleveland Cliffs Iron Company, died in Cleveland, Ohio on De-

cember 11. Mr. Bell received his appointment as a vice president in July 1952 and withdrew at that time from law practice.

Henry Macon Rives, 69, prominent mining figure and member of the Nevada State Tax Commission, died in Reno, Nevada on December 2. At various times during his career he was secretary of the Nevada Mine Operators Association, secretary of the American Gold Conference and the Pan-American Silver Conference, member of the board of governors of the western division of the American Mining Congress, secretary of the American Silver Producers Association and of the Nevada chapter of the American Institute of Mining and Metallurgical Engineers.

G. Temple Bridgman, 71, noted mining engineer who directed the government's search for strategic metals during World War II, died in San Francisco, California on November 25. Mr. Bridgman was a mining engineer with Guggenheim Brothers in New York from 1916 to 1940, was a former president of the Mining and Metallurgical Society of America, constructed a tin smelter for the government at the start of the war, and served as executive vice president of the Metals Reserve Company, an RMI subsidiary.

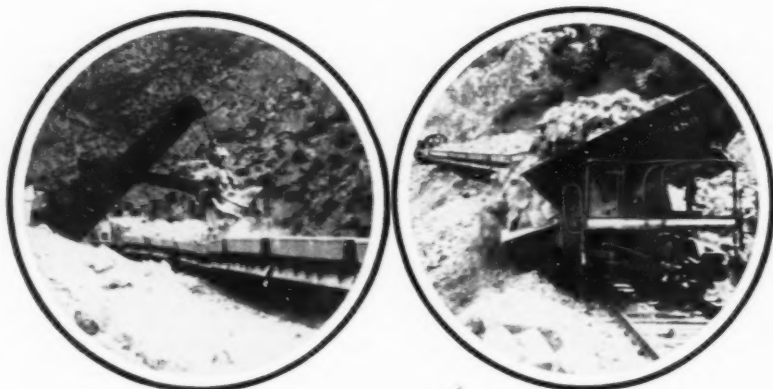
Earle William Berry, 51, registered mining and mechanical engineer, died in San Francisco, California on November 23. Mr. Berry worked in the Philippine Islands from 1926-29 for Benguet Consolidated Mining Company in Baguio and from 1936-40 as superintendent of the Batong-Buba Gold Mines, Lubuagan. He also was employed for a time at Kennecott Copper Corporation's Ruth, Nevada pit, and then was employed by the Turkish government as mill superintendent of the Guleman chrome mine. From Turkey he went to Guatemala for the Compania Minera de Guatemala. His last assignment was in Alaska for the Maritime Sea Transportation Service.

Lewis E. Hanley, 72, retired president of the Hecla Mining Company, died in Wallace, Idaho on November 16. Mr. Hanley began his career as an assayer for Hecla, and served as timekeeper, secretary, general superintendent, treasurer, and vice president. He became president in 1940 and retired in 1951. Up to the time of his death, Mr. Hanley was chairman of the board of directors and head of the executive committee.

John A. Church, 67, consulting engineer and wartime head of the copper and zinc unit of the War Production Board, died in Washington, D. C. on November 11. In 1946 he joined the Economic Cooperation Administration and the Defense Materials Procurement Agency. In 1941 he collaborated in the editing of the third edition of the Mining Engineers' Handbook.

Edward A. Schuch, 49, chief engineer for Aero Service Corporation, died in Feasterville, Pennsylvania on November 11. A founder and charter member of the American Society of Photogrammetry, he was head of the Division of Cartography, U. S. Soil Conservation Service, before joining Aero Service in 1938.

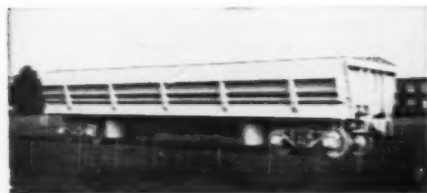
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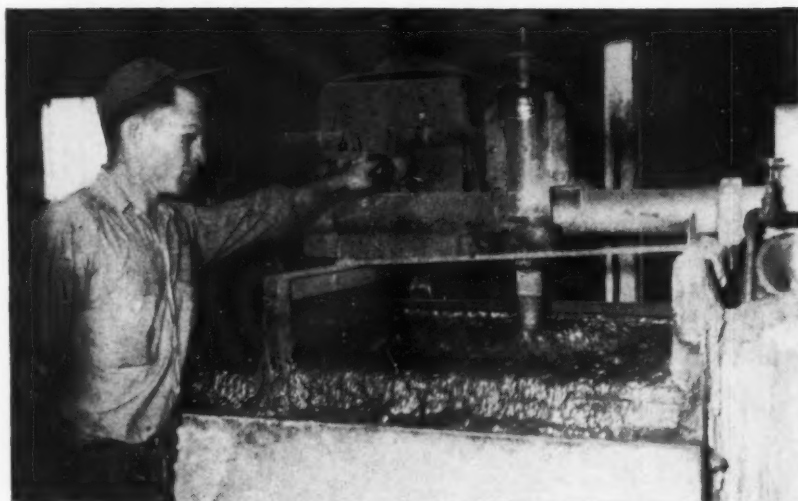
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ACTIVITIES OF INTERNATIONAL MINING MEN



Two Mount Morgan, Ltd. officials—F. H. PICKLEMAN (left), consultant, and S. S. PULLAR (right), smelter superintendent—are pictured above discussing improvements to be made in copper smelting practices and recovery of pyrite from the ore. Pyrite has been rejected as waste at the Queensland, Australia plant, but under the new scheme it would be used as a source of sulphur.

Walter J. Donnelly, former United States high commissioner for Germany, has accepted a position with United States Steel Corporation in Central and South America. Mr. Donnelly, reputedly one of the United States' leading experts on relations with the American Republics, will make Caracas, Venezuela his headquarters.

Harry J. Wolf, New York mining engineer, is in Crete examining iron and nickel deposits. From there he will travel to French Morocco to investigate manganese properties, and then will go to Portugal to look over uranium and tungsten prospects. Mr. Wolf expects to return to this country early in 1953.

A. H. Jones, director of the export division of Gardner-Denver Company, recently returned from an extensive tour through Venezuela, Puerto Rico, and Cuba, where he inspected numerous construction projects.

R. S. Young, director of research for Industrial Distributors (1946) Limited in Johannesburg, South Africa, is at present visiting Canada. He may be reached at P. O. Box 447, Aurora, Ontario.

M. B. Nicholls, president of Nicholls Minerals Corporation, Cincinnati, Ohio, is in Peru aiding in the development of heavy minerals in that country. According to reports, Nicholls Minerals will be consultants to unnamed Peruvian interests and exclusive sales agents in this country for these interests.

J. W. Thorburn, mine superintendent for Mt. Isa Mines, Ltd., Mt. Isa, Queensland, recently returned to Australia following a three-month business trip to the United States and Canada. During the course of his traveling, he visited mines in British Columbia, Washington, Idaho, Montana, Colorado, and Utah. He termed United States mining practice "tops," and

added, "It is always a pleasure to go underground in the Canadian and United States mines."

Four geologists affiliated with Behre Dolbear and Company, New York firm, are traveling to the Galapagos Islands off Chile to make a geological reconnaissance of Isabela Island. The party includes Dr. Charles H. Behre, Jr., Dr. A. F. Banfield, David St. Clair, and Guillermo Bixby.

W. E. (Tex) Romig is now resident manager of GEOMINES at Manono, Belgian Congo. Before going to Africa he was general manager of the Copper Range Company at Painesdale, Michigan and prior to that, was superintendent at the Climax Molybdenum Company's mine at Climax, Colorado.

Richard C. Bogue and Gus H. Goudarzi, U.S. Geological Survey technicians, are on assignment for two years in Saudi Arabia assisting that country's minerals exploration program. The two geologists will make a reconnaissance of the country in the vicinity of a planned extension of a railway line from Riyadh to Jidda on the Red Sea. In addition, they will serve as technical advisors to the Saudi Arabian government and to the Technical Cooperation Administration's country director in Saudi Arabia. The men will also aid in the selection of young Saudi Arabian technicians for in-service training grants in the United States.

Dr. E. C. Bain, vice president in charge of research and technology, United States Steel Company, has been awarded the Grand Medal by La Societe Francaise de Metallurgie. Dr. Bain, recognized principally for his work in alloy steels, is the first American to receive the medal, which is the highest honor of the metallurgical society.

E. J. Perry is now working with the Falconbridge Nickel Mines, Ltd., in Falconbridge, Ontario, Canada, under a postgraduate training plan sponsored by the Ontario Mining Association. He graduated last summer from the Camborne School of Mines in Camborne, Cornwall, England.

Joe Monfort has joined the mill staff of the Itogon Mining Company, located in the Bago district, Mountain Province, Philippine Islands. Mr. Monfort, a metallurgical engineer schooled at the University of the Philippines and the University of Arizona, previously was employed by the Balatoc Mining Company. James Mahan and Jack Murray are new additions to the Itogon mining staff.

Robert C. James is a new mining and exploration engineer for Consolidated Zinc Proprietary, Ltd., and is now working in the Rum Jungle uranium area in Australia's Northern Territory.

J. C. Coldham has been appointed general manager of Amalgamated Tin, Ltd., which is located in Greenbushes Field, Western Australia.

JOHN W. SVANHOLM

has resigned as assistant chief engineer and geologist for the Benquet Consolidated Mining Company and the Balatoc Mining Company in the Philippine Islands. He plans to enter private practice in Venezuela as consulting engineer and geologist. Mr. Svanholm has been in the islands since 1937. He was employed by the Atlantic Gulf & Pacific Company, operators of the Philippine Iron Mines, and later went into private practice, specializing in iron mining and magnetic surveying of iron deposits.



M. S. Krishnan, geologist and mining engineer, has been retained by M/S Ram Gopal Pasari to mechanize the firm's manganese and iron ore mines and to make a geological survey of their holdings for manganese. The mining company operates in Baraburu, P. O. Barajamda, Singbhum District, Bihar, India.

R. A. Mackay and G. A. Schnellman are in partnership as consulting geologists at 115 Moorgate, London E.C. 2, England.

Gorges Carrette, former executive for various French mining companies, is now an independent consulting mining engineer, with offices at 164, rue du Faubourg Saint-Honore, Paris VIII^e, France.

H. Grace is new general manager of Nchanga Consolidated Copper Mines in Northern Rhodesia. He succeeds W. A. Pope, who recently retired. H. Nelles, manager of Rhokana Corporation, is new manager at Nchanga mines and L. Allen is new manager at Rhokana mines. Both firms are headed by Sir Ernest Oppenheimer.

Reginald Ralph Hahn has been appointed a director of Nickel Corporation of Africa, Ltd., and Charles A. Mitke recently acquired the same position at Uis Tin Mining Company (S.W.A.), Ltd.

S. Christie has started work on an unspecified job at the Rum Jungle uranium area in Australia's Northern Territory. He was manager of the recently closed National Oil Pty. Ltd., Commonwealth government shale-oil refinery at Glen Davis, New South Wales.

EUGENIO PEREIRA LAZARO has resigned from the Angola Diamond Company in Dundo-Lunda, Angola (Portuguese West Africa), where he worked in the firm's diamond recovery plants. He is now making his headquarters at Rua Jose Falcao, 9-4^o, Esq., Lisbon, Portugal.



Progress in Motor Grader Design

Allis-Chalmers new AD-40 shows importance of visibility. Operator can see front wheels — both ends of blade while he works.

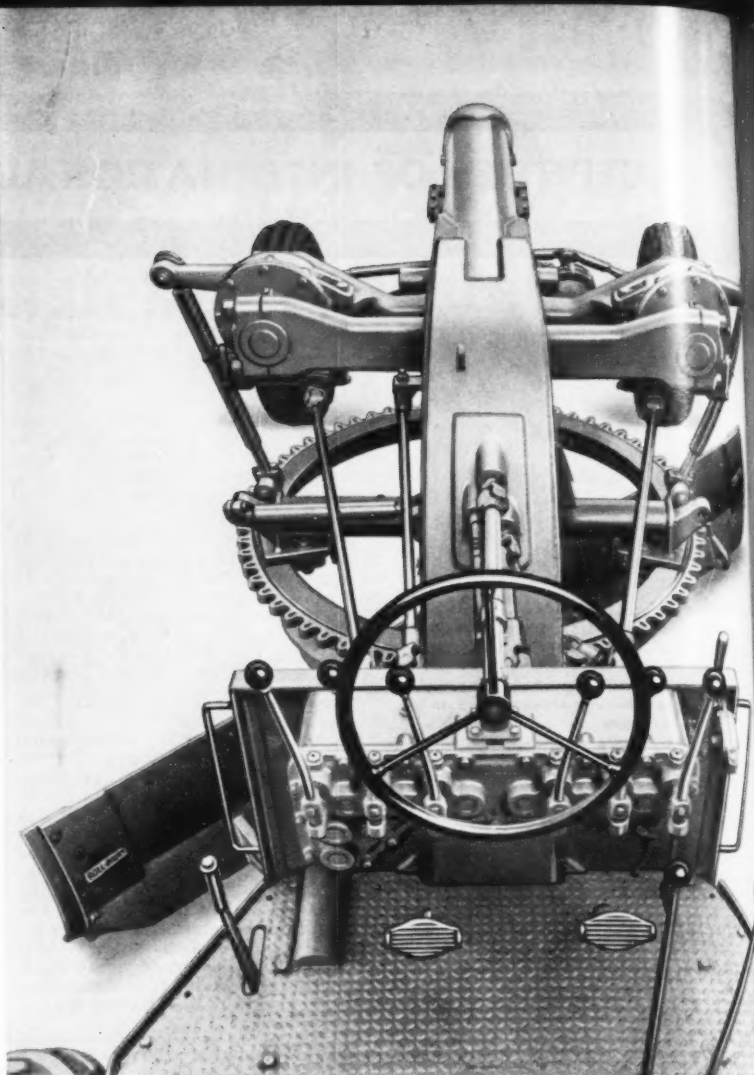
A MOTOR grader operator has to be able to see his work to do a good job, whether he's rolling big windrows or doing highly accurate finishing.

Here is how Allis-Chalmers engineers made sure the new AD-40 met these requirements. They carried A-C's single member frame all the way from the front axle to the platform; cut down the size of the lift cases to eliminate blind spots; lowered the control box and eliminated assemblies from the front panel to provide better visibility of the work area directly in front of the operator; tapered the front edges of the platform so that he could see both ends of the moldboard as he works.

A-C fieldmen also knew that a grader operator likes to sit down whenever the job permits. So they've not only given him ample leg room for stand-up operation but also a steering wheel of adjustable height and a seat that rolls forward at a touch for sit-down operation.

Combined with a new kind of power steering, these advanced design features are making Allis-Chalmers AD-40 an increasing favorite with operators and owners alike because it means more work done with less effort. For more facts on the AD-40, it will pay you to see your nearby Allis-Chalmers dealer soon.

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(above) Here is actual view operator has from platform of Allis-Chalmers AD-40, showing how well he can see both ends of the blade and both front wheels.

(below) The AD-40 has 104 brake horsepower, 23,000 pounds of weight and tandem drive traction, all needs to do a better job on heavy duty construction . . . a faster job with maintenance.



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INTERNATIONAL NEWS

Will Develop Brazilian Manganese With U. S. Aid

A \$67,500,000 loan from the Export-Import Bank, together with a purchase contract from the Defense Materials Procurement Agency will give the United States more high-grade manganese ore from deposits in Brazil.

The project will be undertaken by Industria e Comercio de Minerios, S. A., who expects to produce 5,500,000 tons of manganese ore. The United States is to get at least 70 percent of this according to the DMPA contract. Under the terms, the company will deliver to the U. S. stockpile in 1956 and 1957 a total of 10,000 tons of ore at a price 10 percent below the market at the time of delivery. Also, the U. S. government will have option to 30 percent of the total output at the same price. In any case, the contract provides that the U. S. must be offered at least 70 percent of each year's total output.

In turn, the DMPA has guaranteed the company a floor price of 65 cents per long ton unit based on 45 to 47 percent ore (c.i.f. eastern seaboard ports) for any part of production, up to 5,500,000 tons.

The deposits are located about 150 miles northwest of Macapa in the federal territory of Amapa. Before mine development gets under way, housing, railroad, dock and loading facilities must be constructed. Large-scale production is expected to start in 1956.

Bethlehem Steel Company holds partial stock in the Brazilian firm.

Oppenheimer Forming New Rhodesia Copper Company

A new copper mining company with a potential production of 4,000 short tons of copper per month will be formed in the near future, according to a report made by Sir Ernest Oppenheimer to the shareholders of Rhokana Corporation, Ltd. of Kitwe, Northern Rhodesia.

The property will be named the Bancroft mine, in honor of Dr. J. A. Bancroft, consulting geologist of the Anglo-American Corporation of South Africa, Ltd., for many years.

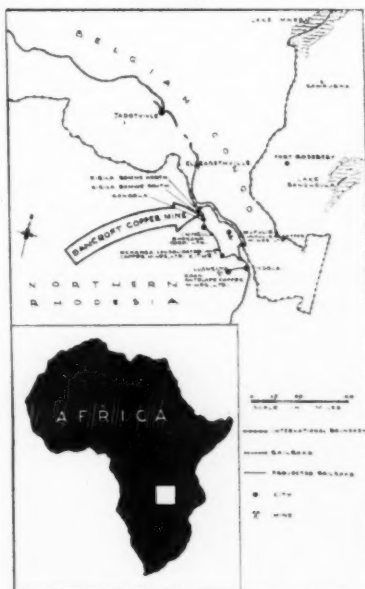
The company is being organized to develop the Konkola, the Kirila Bomwe North, and Kirila Bomwe South ore-bodies, which occur in special grant areas leased by Rhokana from the British South Africa Company under a royalty agreement. The special grants area covers 66,848 acres, and prospecting rights are also held over an additional 6,140 acres to cover possible extensions of the ore-bodies in depth. Diamond drilling programs have shown the properties to have approximately 80,000,000 tons of proven ore reserves with an average copper content of 3.60 percent. The Konkola ore-body is estimated to contain 32,900,000 tons with an average copper content of 2.48 percent, and the Kirila Bomwe North and South contain approximately 46,700,000 tons of ore of 4.39 percent copper content. It is anticipated that the mine will have a life of at least 40 years.

A concentrator with a capacity of about 150,000 tons a month will be built at Kirila Bomwe to treat the ore from the mine, which will be located near the Belgian Congo border about 14 miles northwest of the property of Nchanga Consolidated Copper Mines, Ltd. The concentrate will be railed to the Rhokana smelter at Nkana, some 55 miles away, with no major additions to the latter plant expected.

A railway from Nchanga to Kirila Bomwe will be constructed, roads built, the new mine linked with the electric power grid which serves all the Copperbelt mines, and a separate mining township will be built for both European and African employees. Preliminary work has already begun at the site, and an aerial survey has been completed. Approximately £300,000 has been spent to date, and it is estimated that it will take five years and £11,000,000 to bring the mine into production.

No reports are available yet on the financing of the new company, but Sir Ernest said in his report to the shareholders that the new company will benefit from "the special taxation treatment now afforded to new mines in Northern Rhodesia." In pursuance of a policy to encourage new mining developments, the Northern Rhodesian government is allowing all capital expenditures incurred up to the end of the fifth year of operations to be charged against profits for the entire period. Any balance remaining after such a computation has been made, as well as all future capital expenditure, can be charged in full against available profits. This procedure is followed during the life of the mine or for 20 years, depending on which period is shorter.

Place-fix map of the new Bancroft copper mine.



U. S. Steel To Join In French Manganese Project

A Franco-American company is to be founded by United States Steel Company and French mining interests to develop manganese deposits in Gabon, French Equatorial Africa.

U. S. Steel will subscribe to 65 percent of the initial 5,000,000-franc capitalization. Compagnie Minière de L'Oubangui Oriental will furnish 10 percent, Group Mokta Hadid, 10 percent, and Bureau Minière de la France d'Oltre-Mer, 15 percent. Each of the participants has agreed to grant the new company funds up to a total of 100,000,000 francs in proportion to the initial subscription. Mining operations will not begin until the results of research are known.

Approval by the French government and the granting of a general research permit are the only steps yet to be taken.

\$400,000,000 To Be Spent On Gold Coast Aluminum

The British government has announced its preliminary support of a program which will make the Gold Coast in Africa one of the world's largest producers of aluminum. Plans call for eventual production of 210,000 metric tons of aluminum in 20 years, at a total cost of £144,000,000 (\$403,300,000).

A government commission is being established to continue technical investigation and to work out a master agreement between the Gold Coast government, the British government, the Aluminum Company (British), and the Aluminum Company of Canada. The two governments will furnish hydroelectric power, shipping facilities, and public works and services, with private industry building the smelter and refinery, and mining the bauxite. The financial breakdown is: British government, £56,800,000 (\$160,040,000); Gold Coast government and private investors, £44,600,000 (\$124,800,000); aluminum companies, £42,600,000 (\$119,280,000).

The work will be done in three stages, with the first taking from five to seven years and costing £100,000,000. Production capacity will be 80,000 tons a year. The second stage will bring the figure up to 120,000 tons, and the third to 210,000. About 75 percent of the aluminum produced will be exported to Britain, which now imports four-fifths of its annual supply (203,000 tons in 1951) from dollar areas. The proposed project should enable Britain to cut her dollar purchases of aluminum a third in about seven years. Known reserves of bauxite in the colony exceed 200,000,000 long tons and have been the subject of commercial investigation since 1938. At present, bauxite ranks fourth among Gold Coast products.

The project will involve harnessing the 1,000-mile-long Volta River with a dam and power plant at Ajena 70 miles from its mouth, producing a continuous 560,000 kilowatts of power and an artificial lake 2,000 square miles in size. The dam and power plant will be largely financed by Britain with a small contribution from

INTERNATIONAL

the Gold Coast government, and will account for 40 percent of the total outlay.

A smelter will be built 12 miles away at Kpong at a cost of £64,000,000. Plant capacity will be 120,000 long tons of aluminum annually. The smelter, costing about 42 percent of the total, will be largely financed by the two aluminum companies, but will require loans from both governments.

The Gold Coast government will wholly finance construction of new port facilities at Tema, 50 miles west of the mouth of the Volta. It will also build new rail lines between the port, smelter, and nearby bauxite deposits, as well as new highways, schools, and housing. This work, already started at Tema, will cost about 18 percent of the total outlay.

Loan to India for More Iron and Steel Output

A \$31,500,000 loan has been approved by the International Bank for Reconstruction and Development for a major expansion of iron and steel production in India. The loan will help the company to carry out a five-year project for increasing its blast furnace capacity from 640,000 tons to 1,400,000 tons of iron per year, and for raising finished steel capacity from 350,000 tons to 700,000 tons annually.

The borrower is the Indian Iron & Steel Company, Ltd. whose facilities are located in West Bengal. As of January 1, 1953, the Steel Corporation of Bengal, Ltd. merged with the Indian Iron & Steel Company combining all plants and facilities under one management.

The program consists of expansion of the integrated facilities at Burnpur; the modernization of IISCO's iron plant at Kulti; and expansion and mechanization of iron mines at Goa. Total cost is about \$73,500,000, more than half of which will be met out of IISCO's revenues and by loans and advances from the Indian government; the bank's loan will be used to pay for imported equipment and services.

Open Pit Copper Mining At Ancient Israel Site

The Israeli government plans to open pit mine 100,000 tons of copper ore from the Nahal Timna area of southern Negev, ancient site of King Solomon's mines, within the next seven months.

Abraham Dor, chief engineer of Israel Mining Industries, reported that test borings have been made and that possible ore reserves exceeded 40,000,000 tons at a site covering approximately 750 square acres. The government has made an initial investment of \$1,500,000 in the project, and is beginning to mine and smelt copper at the site for the first time in nearly 3,000 years.

The Belgian Company, Societe Belgo-Continentale des Minerais et Metaux is sending engineers and geologists to assist in technical planning and in the purchase of equipment. Full-scale production is expected to begin within two years.

Approximately \$11,000,000 has been set aside to expand production of rock phosphate and to do preliminary field work in exploiting feldspar, sulphur, and bituminous limestone deposits. In addition, the mining corporation is investigat-

ing the possibility of extracting iron ore from the Negev area and manganese from the King Solomon mine site. Surveys of peat deposits in the Huleh area, according to Mr. Dor, have already been completed and they are being considered for use as organic fertilizers.

Production and Export of Some Mineral Commodities From the Union of South Africa and South West Africa During the First Six Months of 1951 and 1952 in Short Tons

Mineral	Jan.-July 1951	Jan.-July 1952
Union Of South Africa		
Antimony ¹	8,108	12,294
Asbestos ²	54,494	39,336
Chrome ²	311,487	253,478
Manganese ²	332,032	288,829
Beryl ¹	354	165
Corundum ¹	1,779	2,258
Tungsten ¹	90	166
South West Africa		
Copper ¹	7,830	8,244
Beryl ¹	356	299
Lead ¹	51,503	28,261
Lithium		
Minerals ¹	6,314	5,385
Manganese ¹	2,346	8,600
Silimanite-		
Kyanite ¹	10	609
Zinc ¹	18,569	9,295

1. Production.
2. Exports.

New Shaft Sinking Record Set In Orange Free State

A new rectangular-type shaft sinking record has been established at the No. 2 shaft of Loraine Gold Mines, Ltd. near Allenridge, Orange Free State. During the 30 days of November, 1952, the shaft was sunk an additional 370 feet, bringing the total depth to more than 3,470 feet. It is understood that the feat constitutes a new Orange Free State, and possibly a world, record for this size of shaft. It contains seven compartments and measures 46 feet, 4 inches by 10 feet inside the concrete lining.

The previous record of 347 feet in 30 days was set at this same shaft in June 1952. The crew at the No. 2 has now broken the record for monthly footage excavated on four separate occasions.

In April 1951 in the same area, a world record of 504 feet in 30 days was set at the circular Virginia No. 3 shaft of the Virginia Orange Free State Gold Mining Company (June 1951 Mining World). That shaft has a 24-foot diameter inside the concrete lining.

Albania Plans Increases In Mineral Output by '55

In the course of carrying out its 1951-1955 five-year plan, Albania expects to increase output of essential minerals anywhere from 120 to 303 percent. The increase in monetary terms is from 452,000,000 leks in 1950 to 1,382,000,000 leks in 1955, an increase of 306 percent.

Attention will be given mainly to coal, chromite and copper production quotas, although the Russians are also interested in uranium.

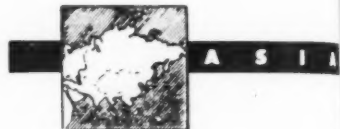
It is hoped that by 1955 coal output will have been raised from 26,300 to

80,000 tons per year, a 300 percent increase. In addition, the Serenica mines are in the process of being mechanized and electrified, the productivity of the miners is to be increased 87 percent and production costs are to be reduced 39 percent.

Chromite is to jump 230 percent to 52,000 tons (1950) to 120,000 tons in 1955. A two-year plan was begun in 1948 by the government to increase production of this mineral 650 percent, but it is not known whether this goal was reached. (Peasant sabotage of the last year resulted in a Russian military mission's taking over exploitation of chrome mines near Lake Ochrida, and the entire industry has generally been under their supervision for the past two years.)

It is expected that copper production will be upped from 900 tons per year to 2,500 tons, a 230 percent increase. Copper production is to be mechanized and geological exploration for new reserves will continue in the Rubik and Derven districts. The goal for reduction in production costs is 43 percent.

It is also believed that a copper processing and a coal cleaning plant will be built.



INDIA—The rare earths plant which went into production in July of last year was officially opened in December by Premier Nehru. Located on a 225-acre plot on the banks of the Periyar River, the 7,500,000 Rupees factory will process monazite found extensively in the coastal sands of Travancore-Cochin. The mineral is first separated from the sands at Chevara near Quilon, and then brought to the new plant for processing.

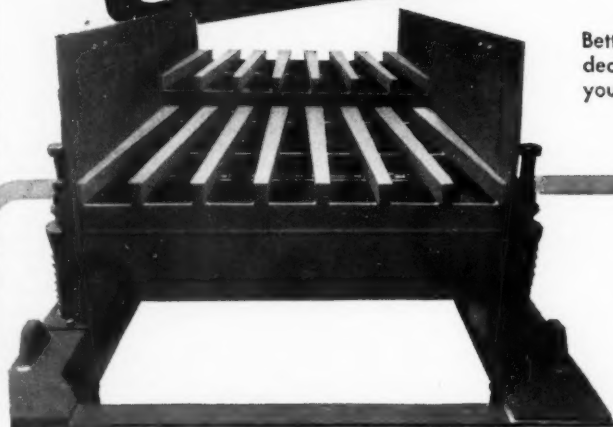
JAPAN—The World Bank will be asked to finance a new iron and steel works which will be built in India and jointly owned by the Japanese and Indian governments. T. Takasaki, president of the Aetna Japan Company, an affiliate of Aetna-Standard Engineering Company and of Electric Power Development Company, both of Tokyo, says that the plant will cost well over \$100,000,000. It will have two blast furnaces with a total annual capacity of 400,000 tons, seven open hearth furnaces and finishing capacity for producing 350,000 tons of structural bars, sheets, and rails. Aetna-Standard is expected to have a large part in the building or engineering of the equipment for the plant.

TURKEY—Large deposits of manganese have reportedly been discovered at Akcakoca, a small town on the northwest coast of the Black Sea.

INDIA—The titanium plant at Trichur in the state of Travancore-Cochin may be reopened. In operation only about one year, it had recently been closed. The State government has an investment of 3,825,000 rupees in the project and is presently considering negotiating a loan from the Industrial Finance Corporation to revive the project. The Indian govern-

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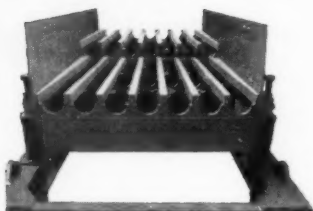
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Double Tapered Grizzly Bar Deck

(for openings 1 to 3 in.)

Longitudinal openings between grizzly bars stay clear because bars provide flared openings. Step deck turns material over, dumping fines from large pieces. Each bar is tapered from back to front and from top to bottom for additional freedom from plugging. Handles feed sizes up to 30 in. diameter.



Straight Grizzly Bar Deck

(for openings 4 to 10 in.)

For run-of-mine screen as shown above for use with straight instead of tapered grizzly bars. Openings between bars are flared from back to front for free material discharge. Handles feed in excess of 1000 tph in sizes up to 3 ft.



Steel Plate Deck with Skid Bars

(for openings 3 to 10 in.)

For run-of-mine scalping where positive scalping is desired. Steel plate decks with skid bars may be obtained with or without step deck construction. Plate deck is bolted to screen body and can be removed easily.

These special decks for primary scalping are available on both Style C and Extra Heavy Duty *Ripl-Flo* vibrating screens.

Ripl-Flo is an Allis-Chalmers trademark.

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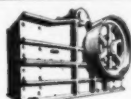
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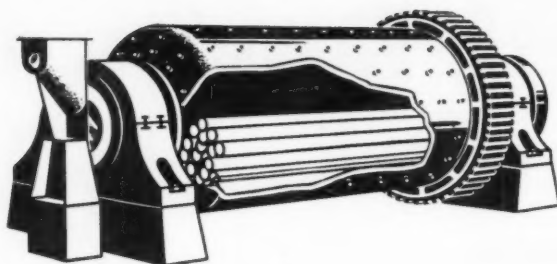


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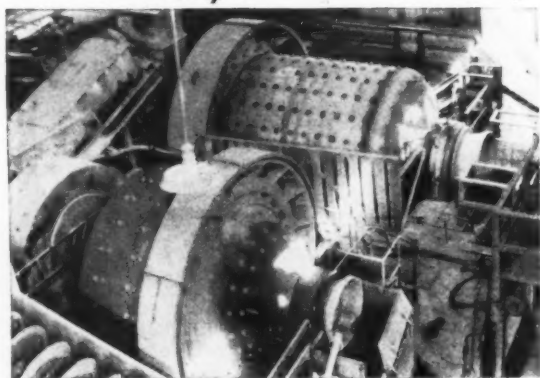
FEBRUARY, 1953

[World Mining Section—47]

55



**CONVEX-HEAD
ROD MILLS**



Lead-zinc concentrating plant of Consolidated Mining and Smelting Company of Canada. Shown here is the largest Rod Mill in existence, a Hardinge 11½' unit. Also one of ten 10' x 48" Hardinge Conical Mills, in the foreground.

The Hardinge Convex-Head Rod Mill is ideal for producing minimum oversize when grinding in open circuit. Pulp level may be changed from high to low for best grinding efficiency and discharge may be made through the periphery (end or center) or discharge trunnion—a very

desirable feature. Another important advantage of this mill is its ability to maintain perfect end alignment of the rods. This prevents undue head wear, eliminates congestion at the feed end, and provides a rough classifying action at the discharge end. Bulletin 25-C-3.

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ment has also agreed to supply technical advice.

SIAM—The No. 1 dredge of the *Siamese Tin Syndicate Ltd.* at Ngow was closed down on November 7, and is now moored at a shallow fresh-water dock. The dredge has been reworking tailings and cleaning up remaining patches of virgin ground, and its cessation of operation was expected by the company.

MALAYA—Reconstruction of the No. 1 dredge on the Penewat section of the *Southern Kinta* properties has been completed. The dredge is equipped with nine-cubic-foot buckets. It began commercial production in November 1951 and, to September 15, 1952, had run 2,764 hours recovering 68 tons of tin.

JAPAN—Production of primary aluminum during September dropped slightly to 3,694 metric tons from 3,939 metric tons in August. However, output during the first half of the current Japanese fiscal year (April to September) totaled 22,959 tons, or 45 tons more than the production goal set for the industry. In the year, the total was 20,200 tons. The first primary metal to be exported since the corresponding period of the previous April was a shipment of 65 tons of primary aluminum to Pakistan in September. The industry hopes to ship to the South American countries in the future.

INDIA—Reserves of bauxite in the Phutka Pahar area and the neighboring ridges in the Bilaspur district of Madhya Pradesh amount to about 365,000 tons according to the Geological Survey of India. An analysis of various samples brought from different localities shows that the percentage of alumina is fairly high, varying from 44.63 percent to 60.24 percent. The ore is thus valuable for aluminum extraction.



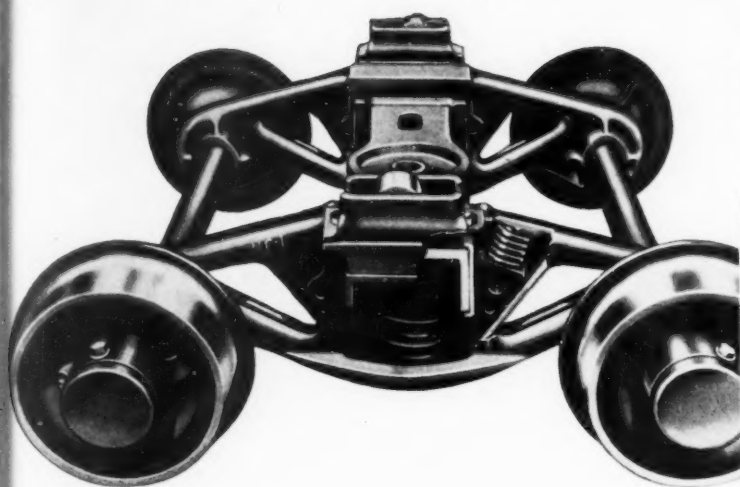
EUROPE

YUGOSLAVIA—The systematic mapping of Yugoslav territory has resulted in the discovery of a large iron ore deposit near Bosanski Novi, where 300,000 tons of ore reportedly have been found. Other deposits have also been reported in Vares, Ljubija, and Nova Litica. While the *Nova Litica* deposit is estimated to contain at least 500,000 tons of iron ore, the *Vares* mine will yield an output of 1,700,000 tons during the next few years. This total is three times the amount of the entire Yugoslav iron ore production in 1951.

ITALY—The *Cabernardi* sulphur mine, which until 1938 was one of the most important in Italy, has reached the point of being about worked out. At the very best, only enough ore is available for one year's operation at a reduced working schedule. The workers are being redistributed among other sulphur mines, as well as reforestation camps.

FRANCE—The *Societe des Mines & Usines de Peyrebrune* is installing a No. 1 Wemco Mobilmill with a 6- by 5-foot drum separator at its lead-zinc *Peyrebrune* mine near Reaumont, France.

ENGLAND—*Derbyshire Stone Company Ltd.* and *Selecton Trust, Ltd.* have jointly formed a new company, *Matlock Lead Mines*, to develop lead and zinc deposits near Matlock in Derbyshire.



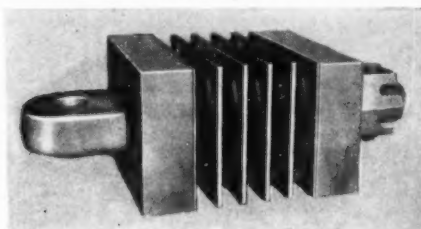
The NC-1 Truck climaxes 20 years of intensive research, providing (through the friction control mechanism shown in cut-away) protection to equipment, roadbed and lading with maximum wear life.



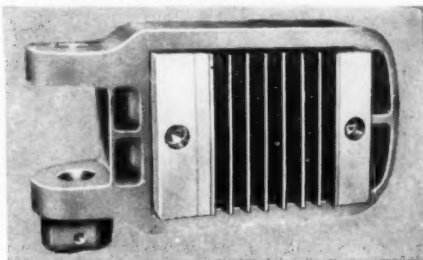
Willison Automatic Couplers save time with maximum safety . . . can be coupled at either end of car or locomotive . . . require no manual assistance. Close coupling eliminates damaging slack, permits high speeds with maximum stability.

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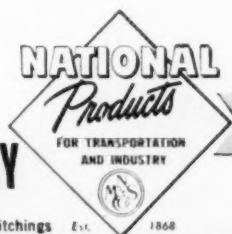
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INTERNATIONAL

Johannesburg Consolidated Investment Company will serve as secretary for the project. The new firm will continue exploration of the Riber Castle area also near Matlock.

DENMARK—A new find of bog iron ore containing manganese has been made at Loegumkloster. Plans are to export low manganiferous iron ore and to retain the higher grades for home industries. Exports are rising and at present about 50 trucks are hauling the iron ore from southern Jutland to Aabenraa Harbor where about 500 tons are being shipped to Germany every day.

AUSTRIA—The **Slazburg Magnesite Works**, operated by the **Rudenthein Magnesite Company**, produced 4,448 tons

during the third quarter of 1952. This represented an increase of 80 percent as compared with the same period in 1951.

CZECHOSLOVAKIA—The report for the third quarter of 1952, issued by the Czech Communist government, revealed that the production plan for the mining and metal processing industry had not been fully met. Being nine percent short of the planned amount, the report said that production in the machine, vehicle, and construction industries had also lagged, and important exports to the east were late or insufficient in volume.

ITALY—Borings conducted jointly by the **Montecatini Company** and local authorities have revealed a vein of iron

pyrites near Castiglione della Pescaia in the Massa Maritima area.

FRANCE—During the first nine months of 1952, French production of iron ore rose to 31,125,000 tons, as compared with 25,800,000 tons for the same period in 1951. The production of crude iron and raw steel (ingots and castings) was 7,200,000 and 7,981,000 tons respectively as compared with 6,414,000 and 7,215,000 during the same period in the previous year. The French steel industry maintained this production increase during October with an output of 1,261,000 tons surpassing all records. Of this amount, 1,000,000 tons came from within France and 261,000 came from the Saar.

NORWAY—Geologists are currently surveying graphite deposits in Glonhorn in northern Norway. Preliminary tests have shown the deposits to contain 10 to 200 grams of uranium per ton.

AUSTRIA—Voest, the Austrian steel concern, plans to mine high-grade iron ore in the Weiz district of Styria west of Birkfeld. The deposits are said to have an iron content ranging between 60 and 74.2 percent. Their presence has been known for years and estimates in the past have placer reserves at 100,000,000 tons of magnetite.



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[World Mining Section—50]



LATIN AMERICA

MEXICO—Sharp decreases in silver and copper production have been attributed to the depletion of some of the best deposits of these metals in Mexico: Hidalgo (Pachuca and Real del Monte), Michoacan, Zacatecas (Fresnillo), Chihuahua (Santa Barbara, Parral, and Santa Eulalia). The decrease in copper is particularly unfortunate just now when relatively good prices prevail for that metal, remarks the Bank of Mexico. However, **Cananea Consolidated Copper Company**, S. A. at Cananea, Sonora, is intensively working low-grade copper deposits seeking volume production, the Bank reports.

PERU—**Banco Minero del Peru** has enlarged its Sacracancha concentrator from 70 to 200 tons per day and has built seven kilometers of a planned 16-kilometer access road for the Chiric hydroelectric power project. The project will give power to the **Castroville** and **Huancavelica** mines. **Banco Minero** is also preparing a flotation section for minus 32-inch sizes at the Chimbote coal washery. A branch office has been opened in Arequipa.

BRITISH GUIANA—All of the assets of **Berbice Company Ltd.**, subsidiary of **American Cyanamid Company**, have been purchased by the **Reynolds Metals Company**. The sale includes plants, machinery, transportation equipment, and a stockpile of high-grade ore containing 58½ percent alumina. No price has been revealed. The operation had been producing about 20,000 tons of bauxite per month, and representatives of Reynolds are studying ways of improving the project. The British Guiana government is said to have given assurances that approval will be given to the transfer of the mining rights. Included

MINING WORLD

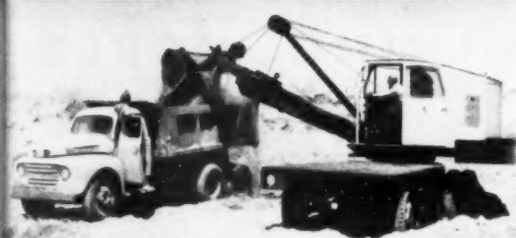
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Eagle-Picher Mine uses NEW LORAIN Scoop Shovel

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Out in a Cardin, Oklahoma, lead mine, there is a new idea at work. It is the Eagle-Picher's Tri State Mine . . . and the new idea is a Lorain Scoop Shovel. Eagle-Picher have put the Lorain Scoop Shovel to work in cramped underground conditions and find outstanding advantages in this revolutionary loading method. The Scoop Shovel, in photo above, loads an average of 600 to 700 tons per shift at a cost reduction approximating \$50 per day over former methods. It will pay you to investigate the reasons why Eagle-Picher put this new, modern Lorain method to work.

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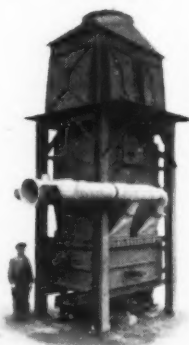
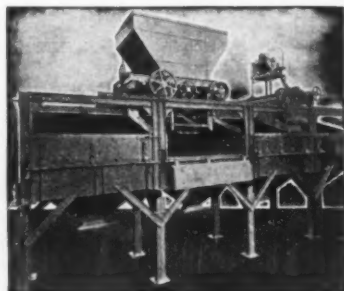
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INTERNATIONAL

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CHILE—Despite the raise in selling price, the Central Bank of Chile reports that a total of 238,500 tons of Chilean copper have been sold to the United States and other foreign countries. The price was increased eight cents per pound last May to the basis of 35.50 cents f.a.s. Antofagasta, following Chilean cancellation of an agreement requiring Chile to sell 80 percent of its output to the United States at 27.50 cents per pound. Large Chilean copper producers report that there is no lag in sales—every pound is being sold as fast as it is produced. However, the government has announced that 50 percent of the exports should be shipped in Chilean ships and this is expected to cause a supply crisis since Chile does not possess enough vessels.

PERU—With the aid of a \$600,000 loan from the Export-Import Bank, *Fermin Malaga Santolalla e hijos* has almost completed building a road to its tungsten property in the Department of Ancash. Only 25 miles remain to be finished. The money is also financing construction of a 250-ton-per-day concentrator.

BRAZIL—Iron ore exports through the port of Vitoria by *Cia. Vale do Rio Doce, S.A.*, earned \$19,652,022 by the end of October. This was nearly double the figure for the same period in 1951, reflecting the tremendous rate of progress which has been shown since 1950. Total quantity of iron ore exported in 1952, through October, amounted to 1,260,000 tons. The company plans to boost its production to rate to 3,000,000 tons.

MEXICO—Exports during the first ten months of 1952 were 12 percent higher than the figure for the same period of 1951. Specifically, the following were exported: 234,119 tons of copper, lead, and zinc (\$97,950,000); 1,050,825 kilograms of silver (\$25,575,000).

JAMAICA—The new plant of *Alumina Jamaica, Limited*, a subsidiary of the *Aluminum Company of Canada*, has started initial production of 120 tons of alumina daily. To this plant goes the distinction of being the first to produce alumina in the Caribbean region. The plant is located at Manchester in central Jamaica. Production is expected to be expanded to 450 tons daily at a later date.

ARGENTINA—In an attempt to boost the mineral output of the country, a new Five-Year Mining Plan has been approved which calls for governmental expenditure of \$600,000,000 to aid mining prospecting and exploration all over the country. Exploration of talc deposits reportedly is being intensified, principally as a result of the increasing need of the industry. There are several talc deposits in the country, particularly in Mendoza, San Juan, and Cordoba.

PERU—*American Smelting & Refining Company's* Peruvian subsidiary, *Northern Peru Mining and Smelting Company*, is making satisfactory progress in its development of the *Toquepala* mine. Drilling has been completed and indicates a very large tonnage averaging a little over 1.0 percent copper. Mining will be by open pit methods. The company is said to be conferring with the Export-Import Bank

about a loan which would help to bring the mine into production.

BOLIVIA—According to Bolivian sources, three citizens have reported their discovery of uranium mineralization to the Ministry of Mines and Petroleum. The men are Moises Astete Landivar, Edmundo Torelio, and Jose Al Haney. The exact location of the discovery was not announced but it is known to be in eastern Bolivia where Haney owns a large area between the rivers Mamore (on the Bolivia-Brazil border) and the river flowing by San Joaquin and Port Siles.



SOUTH WEST AFRICA—In the year ended June 30, 1952, *Industrial Diamonds of South Africa* strapped 626,365 loads of overburden and mined 68,755 loads of sand and gravel. The yield was 20,672 carats, compared with 48,356 in the previous financial year. This was equivalent to a recovery of 50 carats and 126 carats, respectively per 100 loads mined. The lower production was due to the breakdown in machinery, delays in delivery of vital spare parts, and lower grade of terrace material. Diamond sales realized £108,440 compared with £316,739.

FRENCH EQUATORIAL AFRICA—The French government has given its approval to the principle of new special assistance from the United States Defense Materials Procurement Agency for the *Oubanghi Chari Mining Company* of the *Soc. de Recherches et d'Exploitations Diamantiferes* in order to encourage the

development of diamond production in French Equatorial Africa. Loans have already reached 614,000,000 francs and \$500,000 has been contributed by the ECA. The new advances, totaling \$5,975,713, will be reimbursable by the delivery of diamonds to the U.S., spaced over the next 10 years. The rate of interest is 5 percent.

NIGERIA—*Jantar Nigeria Co. Ltd.* reports that output for the year ended September 30, 1952 was 258 tons of tin, compared with 266 tons in the previous year, and 214 tons of columbite as compared with 232 tons in 1951. Average price of tin was less than for the previous year but that of columbite was greater and has since been raised. This will also raise the marginal limit for working and will justify some expense in renewal of equipment. At the present rate this will be completed by the end of 1954. Equipment for investigating the Basalt lead operations will soon be installed and experimental operations will then be started.

FRENCH MOROCCO—During the first nine months of 1952 the production of minerals has shown a steady increase over the same period in 1951. This is particularly the case with cobalt ore (7,690 tons as against 4,230); iron ore (484,500 tons as against 378,400); fluor spar (2,780 tons as against 585); manganese ores (324,270 as against 268,850); lead ores (85,390 as against 62,090); lead metal (21,550 tons as against 10,830); zinc ores (37,410 tons as against 24,324). Only the extraction of phosphate has shown a marked decrease, the tonnage having fallen from 3,599,000 to 3,120,000 tons.

SOUTH AFRICA—During the calendar year 1951, the *Associated Manganese Mines of South Africa, Ltd.* shipped 463,445 short tons of ore, which was a de-

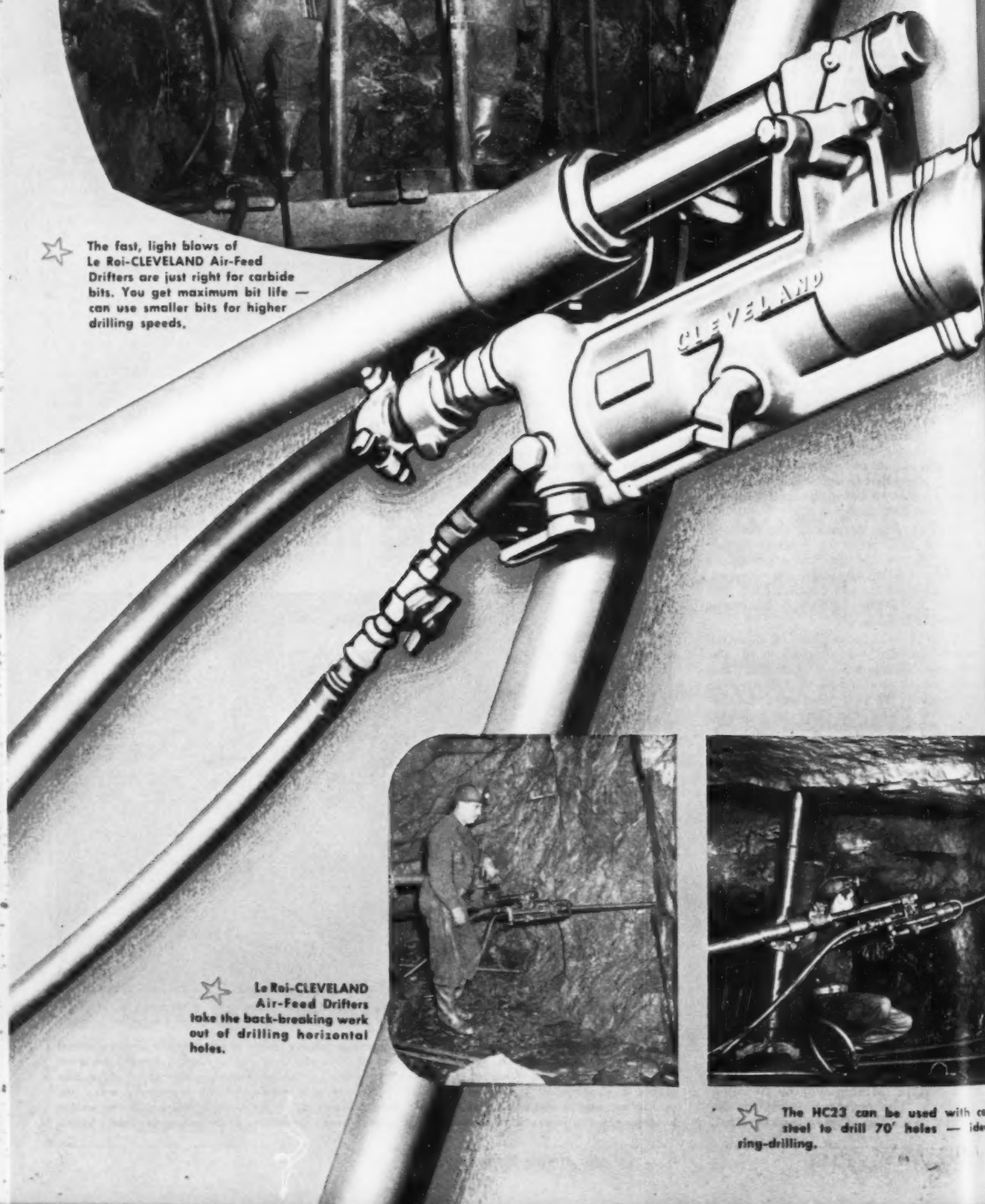


ARGENTINE ANTIMONY OPERATION

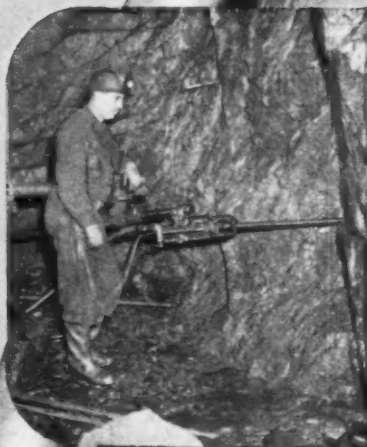
A typical prospector's shaft is shown in the picture above, with a home-made sheave wheel and cable mounted over it. A hand-powered hoist in the rear has a turning handle on each side. This operation is located in the Quebrada de La Cebilla antimony district of Argentina where a geophysical survey of the district recently was made. Results reportedly were encouraging, and a large-scale exploration program will be undertaken to determine the extent of antimony ore reserves. Argentina has produced small quantities of antimony for many years.



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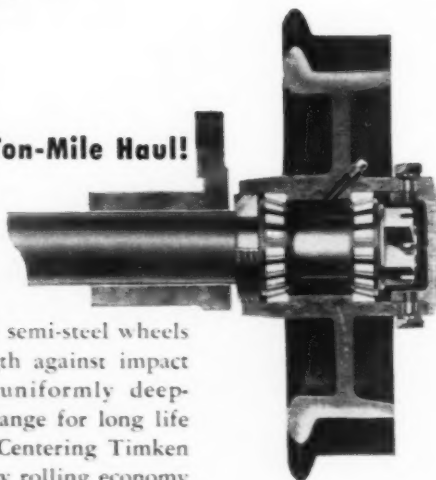
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crease of 89,577 tons on the 1950 figure. This reduction in tonnage shipped was in the net profit of the company, which was due to the continued shortage of transport facilities to the coast, thereby restricting deliveries of ore to the port of Durban. There was, however, an improvement in the transport position during the latter part of 1952 and while the stocks of manganese ore increased, they were covered by orders on hand. The company reports that demands for its manganese ore at satisfactory prices remains firm.

MAURITANIA—The project for mining the large copper deposit at Akjoujt (see *Mining World*, January 1952, p. 5) has been advanced a step further by an agreement on financing. State and private interests will each provide half of the initial capital of 600,000,000 francs for the proposed *Societe des Mines du Cuivre de Mauritanie*. State interests involve the French Overseas Mining Bureau, the General Government of French West Africa, and the Territorial Assembly in Mauritania. The private companies are the *Societe Miniere et Metallurgique Pennarroya* and the *Banque de Paris et des Pays Bas*. After the start of operations sometime this year, further investments will be needed. Initial output is expected to be 20,000 tons of copper annually.

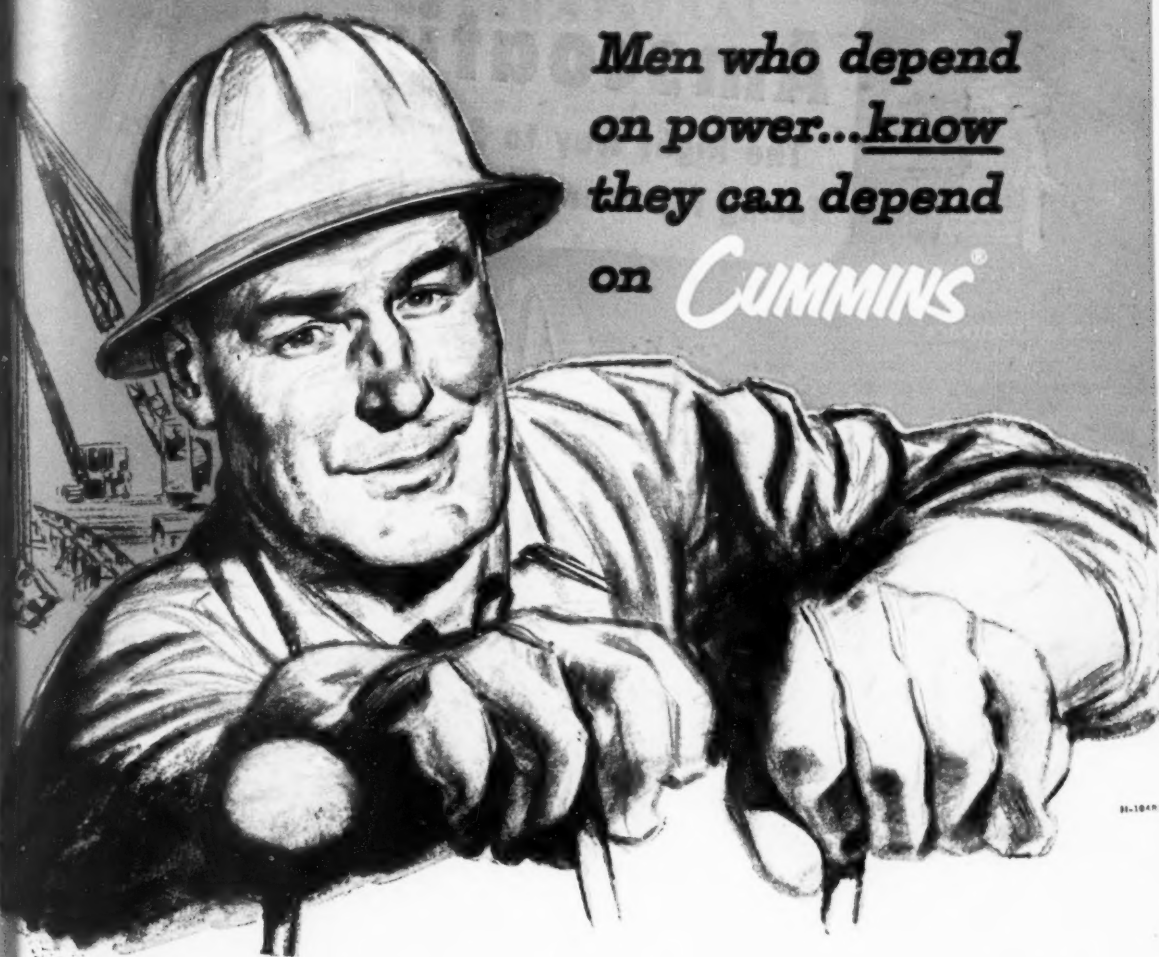
FRENCH GUINEA—Cie. *Miniere de Conakry* will make its first shipments of iron ore to consumers early this year. Initially, shipments are expected to reach a monthly rate of 25,000 tons. This will be increased to 100,000 tons when all facilities are completed and in operation. A delay in building special ore-loading docks was responsible for the late start in shipping which was originally scheduled for 1952. The company has been established with French and American funds.

GOLD COAST—Ashanti Goldfields Corporation, Ltd. reports exceptionally rich gold values from its latest operations. On the No. 12 level, crosscut No. 141 S.W. has intersected an orebody having a width of as much as 57 feet and an average assay value of 46.8 dwts. or more than 2½ ounces of gold per ton. This is the Obuasi Reef and the intersection is below the Ayeinm No. 4 lode. Another crosscut on the No. 12 level, the No. 105 S.W., has made a reef intersection at 40 feet with an average value of 16½ dwts. per ton, again on the Obuasi Reef. General mines manager is J. I. L. Edwards and consulting engineer is R. M. Park.

TRANSSAAL—It is reported that the *Jaglust* and *Winterveld* mines, along with chrome deposits in the *Lydenburg* deposits of the Transvaal have been sold to a newly formed company—*Jaglust Chrome Mines Company*. These mines and deposits were owned by the late Dr. Merensky.

NORTHERN RHODESIA—The first electrolytic copper has been produced by *Mufulira Copper Mines Ltd.* from the first unit of its new tank-house. Until now, the mine had only produced blister copper. Ultimately, the new plant which will cost £4,000,000, will turn out 6,000 tons of electrolytic copper per month out of Mufulira's total production of about 7,500 tons. The unit has a present capacity of 3,000 tons a month. At present, too, the copper will be shipped in the form that it comes from the tanks, but by 1955 the new plant will be installed so that copper cathodes after coming from the tanks will be melted down in reverberatory furnaces and then cast into forms.

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(9-22-52)

FEBRUARY, 1953

[World Mining Section—57]

65



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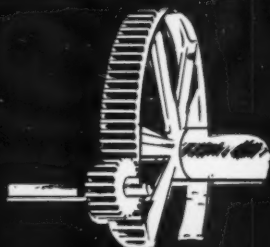
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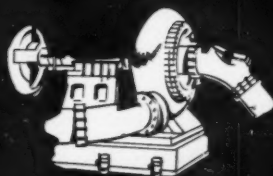
AMSCO V-MANG, bare or coated, for build up and repair on manganese steel castings exposed to impact, work hardens— $\frac{1}{8}$ ", $\frac{1}{16}$ ", $\frac{1}{4}$ ". Microstructure: austenitic manganese steel.

AMSCO CO-MANG, coated only, for build up and repair of manganese steel castings exposed to severe impact. Deposit has excellent impact resistance; work hardens— $\frac{1}{8}$ ", $\frac{1}{16}$ ", $\frac{1}{4}$ ". Microstructure: austenitic manganese steel.



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AMSCO HF-40 for severe abrasion, moderate impact. Deposits have excellent weldability. All diameters, coated only. Microstructure: martensitic cast iron.

AMSCO AIR-HARDENING for abrasion and severe impact. Deposit can be forged to sharp edge without loss of hardness. All diameters, bare and coated. Microstructure: martensitic steel.



AMSCO No. 1 and AMSCO No. 6 for combination of corrosion and abrasion or for 1000 F. service and above. No. 1 has greater abrasion resistance; No. 6 is tougher and can be machined. All diameters, bare and coated. Microstructures: No. 6 contains an eutectic carbide mixture in a solid solution matrix, while No. 1 contains large hard wear-resistant chromium carbide crystals scattered through a solid solution matrix.

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INTERNATIONAL

NORTHERN RHODESIA—*Rhokana Corporation, Ltd.* is undertaking a major development in the copper mining industry.

It is sinking a 1,500-foot interior shaft (winze)—the first in Rhodesia—on the 2,140-foot level at Nkana. The shaft will cost about £100 per foot and will take about one year to complete. The rectangular shaft will have six compartments. It is larger than the surface shafts at Nkana and the shaft at Mindola. Dimensions are 42 by 10 feet. The shaft will permit deep development of large deposits of copper and cobalt.

EGYPT—Engineers attached to the Ministry of Public Works are reported to have located deposits of iron ore near El Bahariya. Tentative estimates place the reserves at 20,000,000 tons, lying in a horizontal stratum that is up to 35-feet thick. Principal advantage of the new discovery is that it is easily accessible, not far from Cairo, and plans are already being made for the construction of a steel plant at Cairo. Deposits were previously mined at Aswan.

TUNISIA—In the production category mineral products show significant tonnage increases in 1952 as compared with 1951. This is particularly true of phosphates which have reached or surpassed 50 percent increase. The tonnages produced in the course of the first nine months of 1952 have been as follows: iron ore 26,680 tons (as against 24,580 during the first nine months of 1951, an increase of 8.5 percent); zinc ore 5,810 tons (as against 5,145 tons, an increase of 12.94 percent); iron ore 740,920 (as against 696,870 tons, an increase of 6.4 percent); phosphate 1,710,200 tons (as against 1,137,600 tons, an increase of 51.33 percent); lead metal 19,340 (as against 17,810, an increase of 8.58 percent). However, the exports have undergone a reduction varying between 11 and 15 percent, the exception being iron ore in which the deliveries have increased 16 percent, from 680,580 to 772,880 tons.

SOUTHERN RHODESIA—Excellent progress has been made in developing the crysotile asbestos mine in the Vukwe hills about 15 miles from Shabani by *Rhodesia Monteleo Asbestos Limited*. Two "Aerofall" mills have been erected and the No. 1 mill has been operating under test conditions. Tests have started on the No. 2 mill and the erection of the screening and drying sections of the plant are about finished. Power is available from the 33,000-volt line of the new power plant at Shabani. By the end of September, 15,300 feet had been advanced in the mine, and some 30,000 tons of ore had been stockpiled for the mills. If remaining equipment deliveries are not delayed, the mine should go into full production shortly.

TRANSVAAL—The construction of the plant for the production of grain corundum has been completed by the *Transvaal Corundum Company, Ltd.* Preliminary tests of the product made overseas have been satisfactory and larger scale tests are being carried out. Upon completion, the future selling policy of the company's grain corundum will be determined. Operation of the plant, meanwhile, has been suspended, but large stocks of good quality grain corundum are on hand for delivery at short notice.

SOUTH AFRICA—*DeBeers Consoli-*

dated Mines, Ltd. has announced that in accordance with its policy of maintaining production from two mines in Kimberley, and having considered the needs of the diamond market, it will renew mining operations at the *Bultfontein* mine, and simultaneously will close down the *Dutoitspan*.

PORTUGUESE EAST AFRICA—A new quay has been built at Beira to substantially increase the capacity of the port. The quay was installed particularly to facilitate the loading of chrome ores from the Rhodesias. Large tonnages of chrome ore reportedly have been accumulating in Southern Rhodesia because of the inadequacy of port handling facilities.

MADAGASCAR—France is reported to be conducting atomic energy research at a geological station at Antisarabe in central Madagascar. Prospectors have found uranium phosphates and chalk in the area, along with other mineral deposits. Roads, bridges, and villages for the native labor have been under construction, and an airfield is also being built to serve this isolated area.



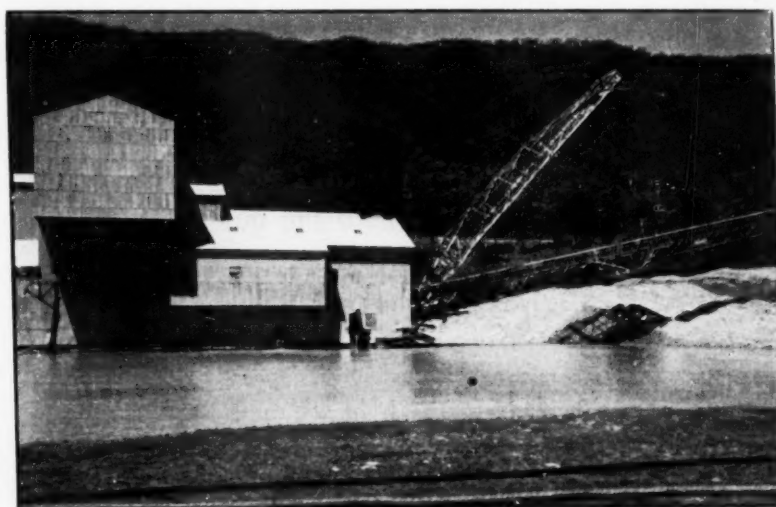
QUEENSLAND—Crushing of copper ore in the new mill section was started by *Mount Isa Mines Ltd.* on December 15. First ore was floated on December 19. The new copper smelter has been completed and was blown in early in January. Ore for the new copper section comes

from the Black Star copper sulphide section of the mine where 3,706,950 tons of 3.8 percent copper ore have been developed. In the year ended June 30, ore reserves at Mount Isa increased by 872,420 tons in the copper orebody. Lead-zinc ore reserves increased by 353,345 tons despite the extraction of 624,522 tons during the year.

PHILIPPINE ISLANDS—The *Philippine Iron Mines Inc.* is installing a pilot HMS Wemco Mobilmill at its mine at Larap, Camarines Norte. It will have a designed capacity of 12 tons per hour treating plus-½-inch and minus-½-inch hematite, magnetite, and limonite ore. Separation will be in a 5-foot-diameter cone at a specific gravity of 3.2. Ferro-silicon will be the medium. The company has rehabilitated its iron ore mine and has been making regular shipments to Japan under the terms of a contract signed with Japanese steel plants early in 1952.

NEW CALEDONIA—Mineral production has shown a steady increase, particularly that of nickel. During the first nine months of 1952, 277,900 tons of nickel ore were extracted, as compared with 173,370 tons during the same period of 1951. The increase in chrome ore extraction was significant but less marked—81,100 tons as against 64,200 tons in the previous year. The tonnage of manganese ore mined increased from 13,650 tons to 14,600 tons. Production of nickel mattes amounted to 3,615 tons as compared with 2,454 tons in 1951, while 5,495 tons of nickel ore and ferro-nickel were produced compared with 3,247 tons in the previous year.

PHILIPPINE ISLANDS—Operations have started at the gold and copper mine of the *Nayak Mining Corporation* by



GOLD DREDGING IN AUSTRALIA

The gold dredge operated by Harriettville (Tronoh) Gold Dredging Company is shown in action on the Ovens River in Victoria, Australia. About 200,000 cubic yards are dredged each month. For the four weeks ended October 18, 194,000 cubic yards were dredged for a gold recovery of 766 ounces. The dredge has been passing through tailings from earlier workings, but recoveries are reportedly improving. There are only two dredges operating on the Ovens River. A few miles away is the smaller and highly profitable operation of the Freeburch Gold Dredging Company, N.L. at Bright. Average monthly yardage dredged here is 37,000 cubic yards for a recovery of 300 ounces of gold.

INTERNATIONAL

Apolinario G. de los Santos, well-known mining operator. The deposits have been worked from time immemorial by succeeding generations of Igorots, Chinese, Spaniards, and Americans. Nayak is southeast of the *Lepanto Consolidated Mining Company's* property. A ton-mill sample of the refractory ore has been shipped to the United States to determine the best flowsheet or method of treating the ore. He presently plans to install a 50-ton flotation mill, and to ship concentrate to the United States for final recovery.

PHILIPPINE ISLANDS—Col. Andres Soriano, president of *A. Soriano and Company*, reports that an option, authorized by the LXL board of directors, was

taken recently on a group of copper claims located between the former mine and the town of Baleno on the Island of Masbate. Exploration work is now being carried out on this project, and if favorable a decision will be made regarding a contract with the *LXL Mining Company* for the full development and operation of the claims. The management of *Masbate Consolidated Mining Company* is undertaking negotiations covering a group of copper claims on another island. Exploration work on an iron ore prospect near Mandaon in Masbate failed to prove any large iron ore body and consequently has been abandoned.

VICTORIA—*Victorian Antimony Mines Ltd.* expects to complete erection of its

plant sometime this month. The plant will roast antimony ore in a kiln to produce a marketable oxide. At present, the *Snowy Mountains Mines, N.L.* is working a wolframite-bismuth base.

PHILIPPINE ISLANDS—*General Metals Inc.* shipped 1,100 wet tons of manganese ore to Japan last November 20—the 18th shipment made by the company since its organization in May 1949—and another 2,000 tons might be shipped shortly thereafter. The company is undertaking construction of a sintering plant at its mining site Bohol. When completed, the plant will treat manganese ore through a process that will reduce if not eliminate the moisture content. At the same time, it will convert the ore into lumps to make them readily acceptable in the market. If completed on the schedule, the new plant will go into operation toward the end of this year.

TASMANIA—The future prospects of the *Electrolytic Zinc Company of Australasia* at Risdon are considered to be sound. Ore mined at Rosebery on the western coast of Tasmania, will be increased 50 percent; the zinc refinery will give a larger future output; sulphate of ammonia will be produced; and zinc will shortly be recovered from leach plant residues.

PHILIPPINE ISLANDS—The worst mine disaster in Philippine mining history occurred at *United Paracle Mining Company*, Paracle, Camarines Norte, on December 16, 1952 when 55 miners lost their lives. They were working in stopes on the 200, 300 and 400 levels of the *San Baluarte* vein which crosses under the Paracle River. *Coco Grove, Inc.*, (also controlled by *Marsman & Company, Inc.* as is *United Paracle*) had dredged the river gravel and apparently the stopes were mined too close to this area, causing the river to break through and flood the workings.

NEW GUINEA—Revised estimates by *Bulolo Gold Dredging, Limited* of future production and the remaining operating life of its five dredges indicate that results for the year ending May 1953 should compare favorably with those of the previous year. However, it is estimated that production and profits will drastically decline from June 1953; in fact, for the year ending May 1954 and 1955, the annual profits are estimated at around \$500,000, after which profits from the dredging operations are expected to steadily decrease. Dredge No. 8 will probably be closed down by May 31, 1953, and Dredge No. 2 during the following year. Dredge No. 4 will not have exhausted its gravel reserves until about May 1955, while it is estimated that, provided there are no substantial increases in costs, the two large dredges, No. 5 and 7, should continue to operate until 1962 or 1963. Dredges No. 1 and 6 are being dismantled and No. 3 has been sold for more than \$150,000. The company has also purchased from *Sunshine Gold Development Ltd.* a small area of hydraulic and dredging ground adjoining that now being worked by dredge No. 4.

DUTCH NEW GUINEA—Promising results have been reported from the survey undertaken by a group of students from Delft University in the Cyclops Mountains. Borings made in the region to the south of the mountains showed cobalt and nickel ores to a depth of 60 feet.



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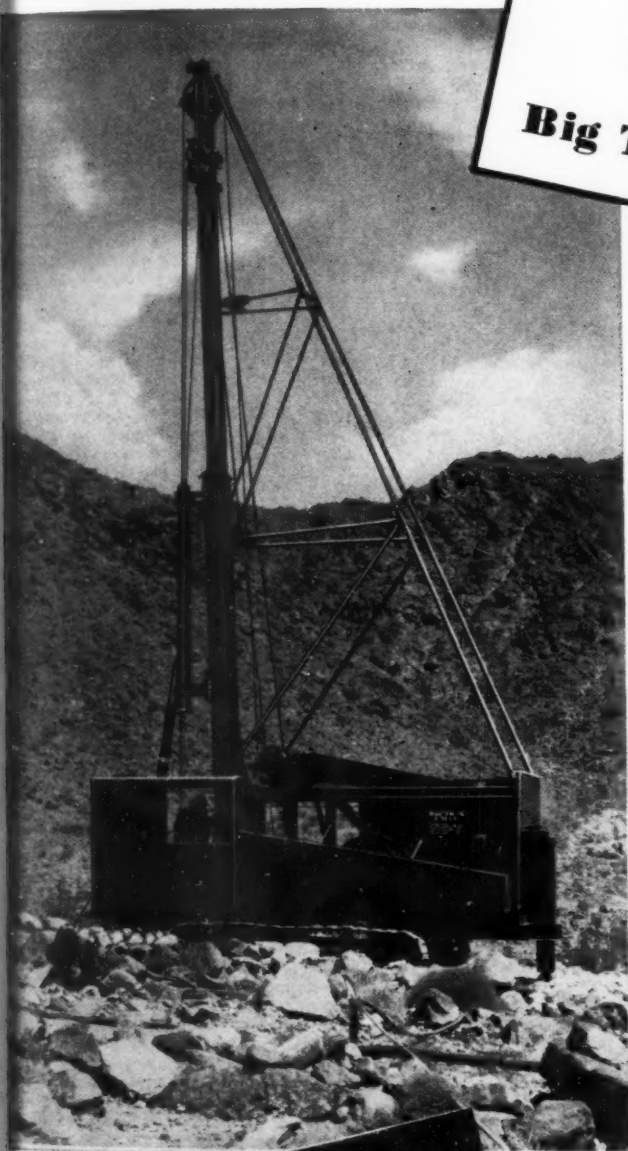
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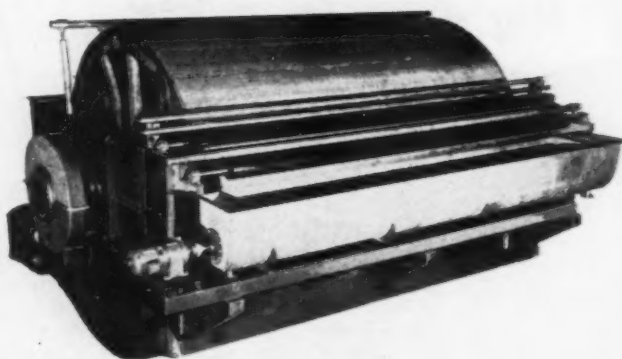
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The main purpose of the expedition is to ascertain whether mineralization exists in sufficient quantities to justify development.

NEW SOUTH WALES—The shaft being sunk by *North Broken Hill Ltd.* has reached the 500-foot level. The objective is 5,000 feet. Progress is expected to improve following the acquisition of new equipment.

TASMANIA—*Tasmanian Tungsten Developments Co. N.L.* reports that the ore has been blocked out and is calculated to return over 15 tons of concentrates worth £30,000. The *Tasmanian Hydro-Electric Commission* has agreed to supply power to the company and *Moina Tungsten-Tin Company*. The Commission is trying to improve power supplies to a number of mining companies in the area.

AUSTRALIA—It has been reported that certain Australian interests are planning to develop newly discovered titanium deposits. One orebody is said to contain about 38 percent rutile, 40 percent zircon, 10 percent ilmenite, 5 percent magnetite and 7 percent other minerals, and is capable of producing more than 100,000 tons of rutile. A new company may be formed for this undertaking.

PAPUA—*Woodlark Island (Papua) Gold Ltd.* has been formed to work the *Kulmadau* mine leases on *Woodlark Island* in the *Papua Territory* under trusteeship to Australia. The registered office is in *Sidney*. An aerial magnetic survey is being made over an area of 35,000 square miles in southwest Papua by the *Australasian Petroleum Company Pty. Ltd.* and *Island Exploration Company Pty. Ltd.* A team of Canadian experts from *Aeromagnetic Surveys, Ltd.* has already arrived.

TASMANIA—*Aberfoyle Tin N.L.* at *Rossarden* has started to deepen its shaft from the 900 level to the 1400 level. The company is a consistent tin producer, averaging about 3,500 tons a month of 40 tons of tin concentrates, and 15 tons of tungsten concentrates.



NORTH AMERICA

ONTARIO—*Glenrock Gold Mines Ltd.* reports that showings of cobalt, with accompanying gold values, have been found on its property in *Hammer town*, five miles north of *Sault Ste. Marie*. A crew, under the direction of *Dr. A. J. Beavan*, is now at work opening up and sampling the five parallel occurrences. The No. 1 showing has been opened to 70 feet and, taking values over a 3-foot mining width, cobalt averages 0.56 percent and gold 0.13 ounce. One sample taken over a width of eight inches averaged 5.92 percent cobalt, 0.20 percent nickel, 1.06 ounces gold, and 0.89 ounce silver.

MONTANA—Open-pit mining of fluorite at a large new deposit near *Darby*, Montana, is scheduled to start this spring by *Cummings-Roberts Company* of *Compton, California*, for the *United States Steel Company*. Development of the property was started in 1951, and stripping operations in 1952 indicate sufficient fluorite for at least 10 years. Shipments were started early last September to U.S. Steel's plant in *Cenozo*.

Utah, and moved at the rate of 250 tons daily until operations were suspended for the winter in December. It is planned to ship at least 600 carloads next summer. E. G. Smith of Wallace, Idaho has the trucking contract and 6½ miles of road were built to facilitate haulage to Durby. Owners of the 11 claims leased to U.S. Steel are A. O. Cumley, Lester Thompson, and R. D. Flightner. They draw royalties of \$7.50 per ton.

NORTHWEST TERRITORIES—Consolidated Discovery Yellowknife Mines, Ltd., reports that in November 1952 the highest grade ore in its history was treated by the mine. The ore was exceptionally rich and caused overcrowding of the mill circuit, resulting in a small decrease in tons milled to maintain recovery at 97 percent. Calculated mill heads for the month averaged 1.33 ounces, \$46.55 a ton at \$35.00 gold, and recovery was 97 percent. Increased government cost-aid benefits for 1953 will add \$1.50 an ounce to Discovery production revenue since ounce production is now double the ounces produced in the base year of 1950. Cost-aid for 1952 is at the rate of \$2.25 per ounce of gold produced. Shaft sinking and station cutting will be completed this week with three new levels established at 1,100, 1,250 and 1,400 feet. First work is now under way on the 1,100-foot level. Development below this horizon will in all probability await delivery of hydro power to the property, scheduled for May 1953.

QUEBEC—Arrangements have been completed by Noranda Mines, Ltd. for \$30,000,000 in new financing. This will allow the company to complete plans for three large-scale projects—copper production facilities for Gaspé Copper Mines, Ltd. on the Gaspé Peninsula; a new sulphur-iron plant to be built on the Niagara Peninsula; and treatment facilities for the zinc-privite property acquired from MacDonald Mines, Ltd. which will be operated by a new company in which Noranda will have a 51 percent interest.

ONTARIO—Northbridge Nickel Mines and Dunvegan Mines have formed a new company as a result of a nickel discovery made on the Dunvegan ground recently. The Dunvegan mines are located in Kenogaming township, about 180 miles northwest of Sudbury. Arrangements have been made for the new company to take over 77 of the 129 Dunvegan claims for 750,000 vendor shares to be received by Dunvegan in the new 3,000,000-share enterprise. Falconbridge Nickel Mines, Ltd. is a part owner of the Northbridge Nickel Mines.

MICHIGAN—Iron ore shipments from Marquette topped the 4,000,000-ton mark this past year but fell far short of the 1951 totals. The navigation officially closed December 7 when the "Benson Ford" departed with a 11,381-ton cargo for the Ford Motor Company's River Rouge plant. It brought the total to 4,066,247 tons of ore loaded onto 429 ships. In 1951, 495 boats took away 4,771,928 tons before the season closed December 1. The mine and steel strikes in midsummer were blamed for the drop in shipments this past season.

ALASKA—The United States Smelting Refining and Mining Company has sold its 10,000-kw. power plant to the Golden Valley Electric Association at Fairbanks. The sale includes a lease agreement whereby the GVEA will lease the power plant to the company who will continue to operate it with the same personnel. The advantage of the transfer

is that the association will now receive power at cost, ultimately bringing a lower rate to the individual consumers in the area.

GREENLAND—A bill regarding the formation of the Nordic Mining Company, Ltd., which is to mine lead in Greenland, has been given its first reading in the Danish parliament. Share capital will be owned by the Danish government 27½ percent, Danish companies (27½ percent), two Swedish concerns, and one Canadian firm. The Swedish companies are Bolidan Gruvaktiebolag and Store Kopparbergs Bergslags Aktiebolag. The Canadian firm is Frobisher Limited. The bill provides that the Nordic Mining Company will be exempt from taxation and customs, but will pay a concession fee varying from 15 to 45 percent of the profits.

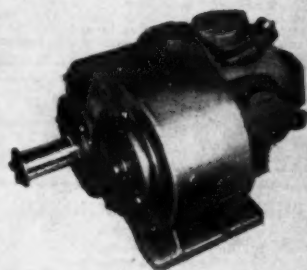
IDAHO—Lucky Friday Silver-Lead Mines has been granted relief under the "undue hardship" clause of the Defense Electric Power Administration's power cutback order affecting users of more than 8,000 kilowatt hours weekly in the Pacific Northwest. The order provided for cutbacks to 90 percent of power used in November 1951, but at that time the company was using considerably less power because its 2,000-foot level had not been opened. President John Sekulic of Mullan reports that barring further cutbacks, and by adding night-shift workers to the day shift and suspending virtually all development work, it will be possible to continue a six-day week and production of about 100 tons of ore daily.

ALASKA—Goodnews Bay Mining Company suspended all operations for the season in November. Dragline and bulldozer work had shut down a few weeks prior to the closing of the dredge. Mining operations for the season were considered very successful. A new 1,400-hp plant was installed for the dredge and shop operations. Late in the season, a new Bucyrus Erie dragline shovel with a 6 to 7-yard bucket was assembled. The dragline will be used for stripping deeper ground next season. A crew of about 50 men were employed.

MANITOBA—Construction work at the nickel-copper-cobalt mine of Sherritt Gordon Mines Ltd. at Lynn Lake are progressing favorably in preparing the orebody for production. Further funds have been received which will aid in bringing the mine into production late this year. Development ore is being treated in the 50-ton pilot mill to supply nickel and copper concentrates for the pilot leaching plant at Ottawa. One shipment from Lynn Lake contained 1 to 2 percent nickel as well as copper, and another shipment from a Quebec mine contained about 4 percent zinc in addition to copper. Eventually, copper concentrates will be treated at the company's ammonia leaching refinery at Fort Saskatchewan which is now under construction. Arrangements are being made to have Noranda Mines Ltd. treat the concentrates until the new plant is ready for operation.

ONTARIO—H. V. Barry of Gatchell, near Sudbury, reportedly has staked 90 new claims on kyanite outcrops in Street and Loughrin townships, east of Sudbury. Surface showings are said to indicate that the deposit may run as high as 50 percent kyanite. Barry also staked the original kyanite claims on highway 17 between Stinson and Wahnapiatae and

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All gearing, shafts and bearings are designed to work under continuous peak loads.

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Eimco Geared Units are available in three sizes, conservatively rated at between 7½ to 17 h.p., each with four different speed ratios.

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is part owner of another 36-claim block in Awrey township.

SASKATCHEWAN—Results obtained from drilling six holes on *Gunnar Gold Mines, Ltd.*'s discovery in the Beaverlodge field have further confirmed the large tonnage possibilities of medium- to high-grade uranium ore. One hole, No. 4, although not completely assayed, is believed to be the best uranium intersection secured on any nongovernment-owned property in Canada. No. 4 hole, starting at 63 feet, secured 57 feet of core averaging 0.403 percent U O or \$58.44 a ton at the current price for ura-

nium. No. 1 hole gave 143 feet of core averaging 0.08 per cent U O or \$11.60 a ton. No. 3 hole gave 121 feet of core assaying 0.08 feet U O or \$11.60 per ton. Nos. 2 and 5 holes had to be discontinued, and No. 6 hole is now drilling 35 feet back from the collar of No. 5 hole. The present program of Gunnar and associates is designed to secure the maximum information as quickly as possible. Drilling is going forward on a 24-hour basis and this will be continued as long as it can be done without undue expense. Drilling has so far been done on a length of only 300 feet of the known 1,200-foot zone length and over not more than half the width of 500 feet indicated at surface.

BRITISH COLUMBIA—The new mill of *Columinda Metals Corporation Ltd.* has been completed. The road in to the *Teddy Glacier* property has also been finished, and present plans are to complete the adit on the lower level in the spring when the work can be done more economically. In addition to 207 feet of new ore opened in No. 5 vein east of the fault averaging 5.34 percent lead, 2.17 percent zinc, and 7.16 ounces silver over 4.1 feet, a new tungsten body has been indicated just west of the above ore body. Average grade on it so far is 0.84 percent WO₃ for a gross value of \$54.60 a ton. A new portal to connect with the bottom level is to be completed this month. Some 1,200 feet of surface track will connect this portal to the mill and eliminate any haulage by trucks or other handling from the bottom level to the mill.

ONTARIO—*McIntyre Porcupine Mines Ltd.* has exercised its option on the *Coulee Lead and Zinc Mines'* property in the Onaman River area of Ontario, and a new company reportedly will be formed to further explore the property.

SASKATCHEWAN—President Walter J. Blair of *Chimo Gold Mines Ltd.* has confirmed reports of the purchase by Chimo of a group of 11 claims adjoining the *Zeemal-Blair* discovery in the St. Mary's channel sector of the Beaverlodge uranium camp. The 11 claims which comprise some 550 acres tie on to ground in the northeast that is traversed by the major regional fault structure with which pitchblende occurrences are associated.

ONTARIO—Total iron ore shipped out of Steep Rock, Ontario, via Port Arthur, for the 1952 season was 1,273,784 tons. The seasonal objective had been set at 1,200,000 tons.

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SuperDuty DIAGONAL DECK No. 6 CONCENTRATOR TABLE

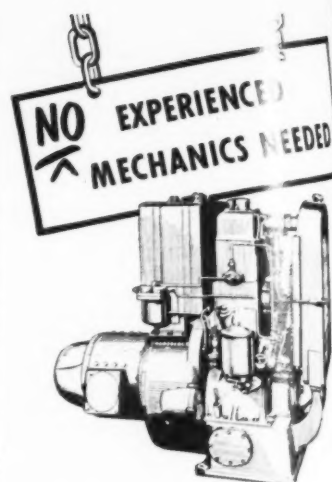


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YUKON TERRITORY—During the 1952 season, *Yukore Mines Limited* completed remodeling of its mining camp and brought in modern machinery and equipment. Drilling, blasting, and other surface prospecting disclosed several previously unknown mineralized zones, some of which have given promise of adding considerably to the ore material available for concentration. A more detailed program of diamond drilling devoted to these disclosures is planned for next season. The company also plans to erect its own concentrator on the property. The base-and-precious-metal property is located at Idaho Hill, 30 miles south of Whitehorse.

SASKATCHEWAN—*Iso Uranium Mines* has been incorporated to acquire a group of eight claims in the St. Mary's Channel sector of the Athabaska area, adjoining *Gunnar Gold Mines Ltd.*'s ground. Preliminary surface exploration has revealed two radioactive zones, both containing visible pitchblende. J. P. Dolan is president of the new firm; R. A. Cranston is vice president and secretary-treasurer.

QUEBEC—Philip Malouf, engineer for the *United Asbestos Corporation Ltd.* reports that a substantial reserve of proven ore has been established by the company, over-all indicated reserves have been increased, and the scale of work has been vastly enlarged at the property since *Lake Asbestos of Quebec Ltd.*, a subsidiary of *American Smelting & Refining Company*, took over operations. Drill-indicated ore reserves are now placed at 74,000,000 tons. Of the proven part of the reserve, lateral work and closely spaced diamond drilling has now outlined some 30,000,000 tons in the east ore body averaging \$8 to \$10 to the ton. The central ore body is expected to grade \$7 to \$9 a ton, while the west or island ore body appears likely to grade between \$11 and \$15 to the ton. According to Mr. Malouf, drilling on the west ore zone has given some rather exceptional assays. Laboratory analysis of diamond drill cores has shown 290 feet of core in one hole averaging 17 percent asbestos or \$16.20 a ton, while another hole gave 240 feet of core assaying 23.25 percent asbestos with a dollar value of \$16.60 per ton. Arrangements have been made by *American Smelting & Refining Company* for the use of the *Continental Asbestos* mill about 4 miles from United Asbestos property for large-scale bulk sampling purposes. Shipments of UAS ore are expected to start immediately and up to 25,000 tons of ore are expected to be treated for sampling purposes.

SASKATCHEWAN—The *Western Potash Corporation* has completed the headframe and hoist at its shaft site about nine miles northwest of Unity. A quarter-mile spur line has been built by the Canadian National Railways to the property. To provide power for shaft sinking operations, a 250-hp., Diesel-plant car has been spotted.

WANTED: Experienced man to manage Iron Ore mine of a capacity of 1,000 tons of ore per hour. This is for a new range with new and modern equipment located in India. In reply give full particulars of experience, age, etc.

Address: C. W. Kinter, 2305 First National Bank Bldg., Pittsburgh 22, Penna.

U.S.A. Metal & Mineral Prices

METALS

JANUARY 20, 1953

COPPER:	Electrolytic. Delivered F.o.b. cars, destination U.S.A.	24.50
	Lake. Delivered, destinations U.S.A.	24.60-27.50
	Foreign Copper. New York	30.00-36.50
LEAD:	Common Grade. New York	14.00
	Tri-State Concentrates, jig, flotation 80% lead, per ton	\$173.70
ZINC:	Prime Western. East St. Louis	12.50
	Tri-State Concentrate, 60% zinc, per ton	\$84.00
ALUMINUM:	Primary 30 pound Ingots (99% plus). F.o.b. shipping points	20.50
ANTIMONY:	Lone Star Brand. F.o.b. Laredo, in bulk	35.00
BISMUTH:	(In ton lots) price per pound	\$2.25
CADMIUM:	Sticks and bars. 1 to 5 ton lots (Price per pound)	\$1.75-\$2.00
COBALT:	97-99%, keg of 550 pounds (Price per pound)	\$2.40
MAGNESIUM:	Ingots (99.8%). F.o.b. Freeport, Texas	24.50
MERCURY:	Flasks. Small lots, New York	\$218.00-\$220.00
NICKEL:	"F" Ingots (5 pounds). F.o.b. refinery, Port Colborne, Ontario	60.00
TIN:	Grade A Brands. New York (Price per pound)	121.50
TITANIUM:	99.3% + (Price per pound)	\$5.00-\$7.00
GOLD:	United States Treasury price	\$35.00
SILVER:	Newly mined domestic. United States Treasury price	90 1/2¢ per ounce
	Foreign Handy & Harman	85.25¢ per ounce
PLATINUM:	\$90.00-\$93.00 per ounce

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO. F.o.b. mine, Colorado	\$43.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at \$400.00 per short ton or by assaying at 8.0 to 8.9% BeO, \$40 per unit; 9.0 to 9.9%, \$45; over 10.0% \$50. F.o.b. railroad cars eastern seaports. Long tons dry weight.	
CHROME ORE:	African (Rhodesian). 48% Cr ₂ O ₃	\$45.00-\$48.00
	African (Transvaal). 48% Cr ₂ O ₃	\$34.00-\$35.00
	Turkish. 48% Cr ₂ O ₃ . 3 to 1 chrome-iron ratio	\$53.00-\$54.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price lumpy ore, \$115.00; fines and concentrates \$110.00 for 48% Cr ₂ O ₃ and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr ₂ O ₃ . At small lot beryl purchase depots. \$3.40 per pound contained combined pentoxides in 50% ore.	
COLUMBIUM-TANTALUM ORE:	Lake Superior. Per gross ton Lower Lake Ports.	
IRON ORE:	Mesabi, Non Bessemer, 51.5% Fe	\$ 9.05
	Mesabi, Bessemer, 51.5% Fe	\$ 9.20
	Old Range, Non Bessemer	\$ 9.30
	Old Range, Bessemer	\$ 9.45
MANGANESE ORE:	Metallurgical grade. 46 to 48% Mn. Long ton unit	\$1.20-\$1.22
	Chemical grade. 80% MnO ₂ . Per ton	\$70.00
	U. S. Government ore purchasing depots: Deming, New Mexico; base price \$2.30 per long dry ton unit of recoverable manganese less handling and treatment costs. Wenden, Arizona; base price of \$8.54 per long dry ton of 15% manganese ore. Butte, Montana; (black and pink ores) base prices of \$4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana; base price of \$6.43 per long dry ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) \$2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	90% MoS ₂ . F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	\$1.00
TUNGSTEN CONCENTRATE:	60% WO ₃ . Per short ton unit	\$65.00
URANIUM ORE:	Carnotite-Roscoelite. F.o.b. purchase depot plus \$0.06 per ton mile (\$6.00 maximum), Grand Junction, Rifle, Durango, Naturita, and Uravan, Colorado. Salt Lake City, Marysville, Thompsons, and Monticello, Utah. Shiprock, New Mexico, Edgemont, S. Dakota. Base price for 0.10% ore is \$1.50 per pound and up to \$3.50 per pound of contained U ₃ O ₈ plus \$0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of \$0.25 per pound for each in excess of 10 pounds. A \$0.50 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime. Carnotite-Roscoelite. V ₂ O ₅ in ratio of more than 10 parts to 1 part of U ₃ O ₈ are generally acceptable at all AEC depots, but excess not paid for at Marysville, Monticello and Shiprock. . . . Per Pound V ₂ O ₅ , \$0.31	

NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots	\$12.50
	Oil Well grade. Packed in 100 pound paper bags	\$14.00
FLUORSPAR:	Metallurgical grade. 70% effective CaF ₂ content per short ton F.o.b. Illinois-Kentucky mines	\$42.00-\$43.00
	Acid grade. 97% CaF ₂	\$60.00
PERLITE:	Crude: F.o.b. mine per short ton	\$3.00 to \$5.00
	Plaster grades. Crushed and sized. F.o.b. plants	\$7.00 to \$9.00
SULPHUR:	Long ton, F.o.b. Gulf Coast mines	\$22.00

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N.Y.

FAGERGREN'S INCREASED FLOTATION RECOVERY PROVED BY COMPARATIVE TESTS

TEST DATA

The increased metal and economic recovery of the Fagergrens is shown in cents per ton of mill heads. Cell volume ratios are total cubic feet of cell volume in the Fagergren test machines versus cubic feet in competing machines handling the same feed rate.

CELL VOLUME RATIOS (Fagergrens to competing units)	METAL RECOVERY (Fagergrens over competing units)	ECONOMIC RECOVERY (Fagergrens over competing units)
1 to 1.8	+ 2c ton	+ 2½c ton
1 to 1.66	+ 2¾c ton	+ 3c ton
1 to 1.07	+ 6¾c ton	+ 6c ton

These are actual results of an extensive test program recently concluded by a progressive mining company seeking to determine the best all around flotation machines to be installed in their plant. The tests conclusively proved Fagergren superiority in terms of lower tailing losses, higher concentrate grade, lower reagent costs, and lower smelting charges. These added up to a substantial dollars and cents advantage in both metal and overall recoveries.

Proof that higher speed of float pays off

These tests and other related data conclusively demonstrate that Fagergrens achieve higher recovery with less cell volume. Note that even with 80% more cell volume, the other machines could not match the recovery of the Fagergrens. Furthermore as the ratio of cell volumes was reduced, the Fagergrens' margin of recovery increased still further.

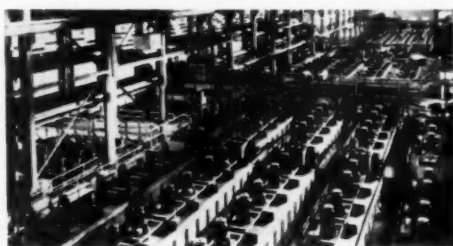
Greater throughput capacity per cubic foot is the direct result of the faster rate of flotation achieved by Fagergren's exclusive rotor-stator principle. This powerful agi-

tating mechanism provides an unmatched efficiency of pulp aeration and dispersion.

To the Fagergren's gains in metal and economic recovery shown in the above data, the fact that fewer cubic feet of machine are required adds these further savings — lower installation costs, reduced floor space, less operating labor, etc.

WRITE TODAY for consultation on your specific flotation problems and for free descriptive literature on Fagergren machines.

Typical installations of Fagergren Flotation Machines.



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INTERNATIONAL

English Mine Expands

(Continued from page 34)

which has been very successful and this is probably the first mine to use such a system. Compressed-air-driven, dry, rotary, Chicago Pneumatic 327-C-700 Power Vane drills are mounted on a special carriage so that they are chain-fed by either an Ingersoll-Rand DJB feed or the Joy Hydro Drill Jib feed. Auger-type drill rods faced with "Harmet" tungsten carbide are used. This hard-faced drill rod costs twice as much as an ordinary rod but is usable for 10 times the footage. Tungsten-carbide-tipped, coal-type bits are used. They are known as concentric grade "5S" Padloy bits and are manufactured by Padley & Venables.

A comparison of drilling speed between percussion and rotary drilling in the same hardness of rock shows the advantage of the rotary drilling: Percussion drilling

speed is from 1.5 to 2.5 feet per minute. Rotary speed is from 2.0 to 8.0 feet per minute. Rounds drilled, per jumbo, per shift have increased from 3 to 4 (percussion) to a maximum of 9, and often 8. A round is drilled in 25 minutes, including time for moving the jumbo to the face and back.

The rotary drill bits are changed and reground every shift by a special crew. Bit life has been up to 10,000 feet of hole drilled.

Of greatest importance to the mining system has been the elimination of water necessary with percussion drilling which made soup out of the clay floor.

The Future

It is planned to continue the entries on a closed panel system, i.e., as the center roads of the production key-room layout. Entry into a new panel will not be made until the area has been encircled with peripheral drainage for three months.

Faults have given trouble lately,

but the general underground picture is now clear from data obtained after many surface boreholes have been put down. Dewatering of the large dip area has started, using a Beresford submersible pump down an 18-inch diameter borehole. Plans have been made for increased output and alterations in technique.

Many difficulties have been overcome, and many problems are still in view. However, it is felt that development can proceed further down dip to help provide the blast furnaces with all the local ironstone they need in the years to come. The mine now produces over 6,000 tons per week with less than 100 men underground, and with a total personnel, including management, just over 130.

Most of the equipment was made in the United States and has been satisfactory. Some details have been altered to suit conditions. Sometimes there were failures, but the output has been increased six-fold in almost four years. Still, more ore is needed to make more steel.

SAUERMAN SCRAPER



Simple, small Sauerman Scraper stores and reclaims 30,000-ton seasonal surplus at lime plant.

Sauerman Scraper reclaims bauxite ore in huge storage building at aluminum smelter.

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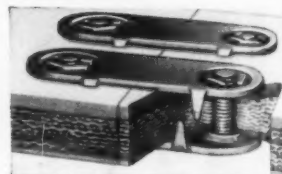
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Here's progress far ahead of old fashioned designs — progress that pays off in steadier production . . . lower tonnage costs! For example —

P&H stepless power regulation gives you smoother, more accurate control . . . completely eliminates the complex make-and-break contactors which cause trouble. Furthermore, P&H Magnetorque* Hoist Drive powers hoisting motions electro-magnetically — gives you faster dipper action . . . freedom from maintenance worries.

But P&H progress doesn't stop with electrical advancements. Here's the ruggedness of welded alloy steels — backbone for a lifetime of service. But let us direct you to a P&H in action — see *all* the modern refinements that make P&H the top producer in the open pit.

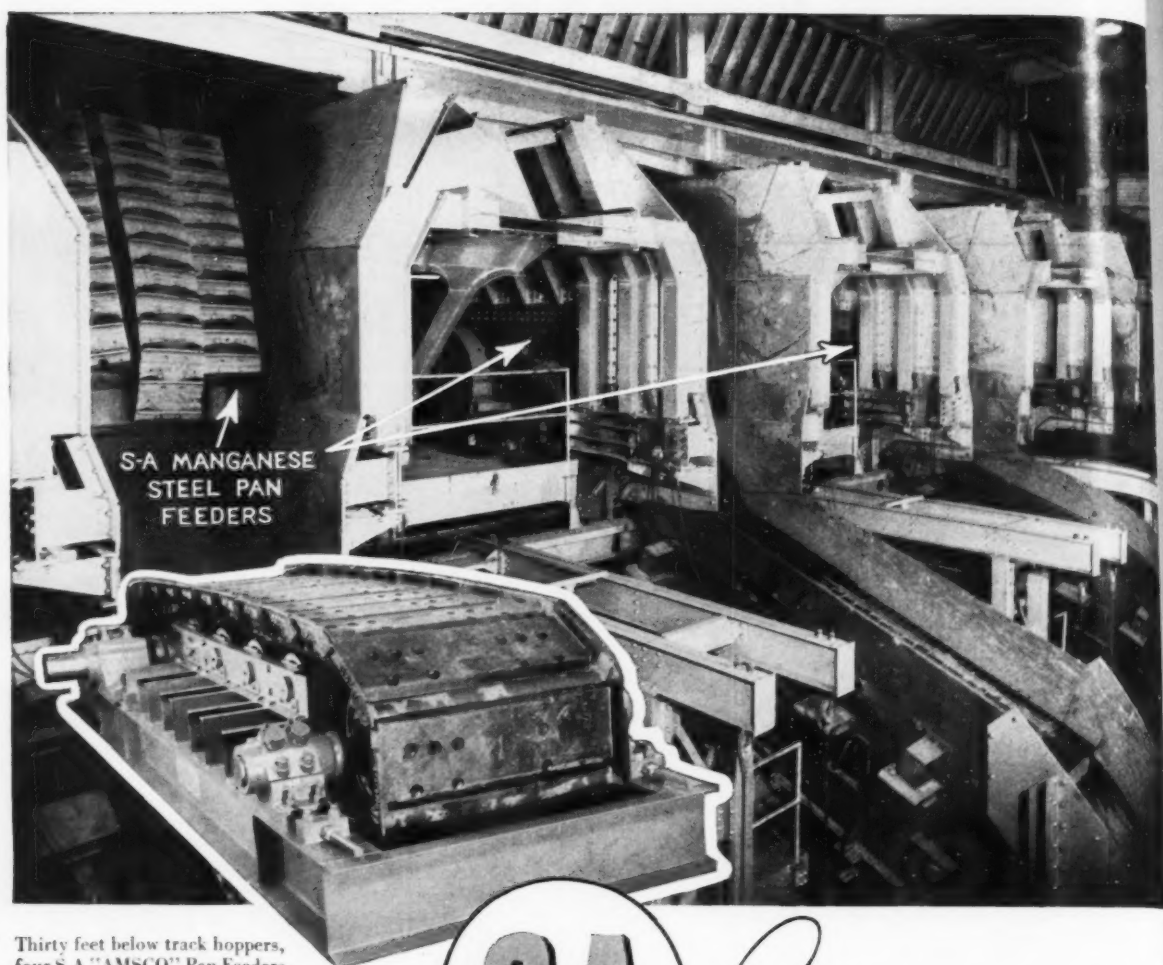
*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

Every third P&H Electric Shovel sold is a repeat order

P&H LARGE EXCAVATOR DIVISION
HARNISCHFEGER,
CORPORATION

4400 W. NATIONAL AVENUE • MILWAUKEE 46, WISCONSIN





Thirty feet below track hoppers, four S-A "AMSCO" Pan Feeders receive ore and rock from side dump rail cars. Each Feeder is 6 feet wide by 27 feet long. Together they have a capacity of 3000 tons per hour. Still another feeder (not shown) collects ore from the scalping screens.

S-A CONVEYING Systems

for **FEEDING ORE**
in high volume ... at low cost

Belt Conveyors
Belt, Pan & Plate Feeders
Ship Loading Boom Conveyors
Stacking Conveyors
Storage & Reclaiming Systems
"Natural Frequency" Vibrating Conveyors
REDLER Conveyor-Elevators
ZIPPER Conveyor-Elevators
Conveyor Belt Cleaners
Headshaft Holdbacks
Grizzlies & Screens
Centrifugal Pilers
Bin Gates & Tonne Gates
Car Pullers & Spotters
Bucket Elevators
Skip Hoists
SEALMASTER Ball Bearing Units

• Write for a bulletin
on any of the above

Feeding huge volumes of heavy, abrasive ore and rock from receiving stations to scalping screens and primary crushing is one of industry's most punishing handling jobs ... Yet S-A "AMSCO" Manganese Steel Pan Feeders have shown they can withstand and thrive on such crushing impact and abrasive loads ... thousands of tons a day ... year after year ... with a minimum

of maintenance.

Almost incredibly rugged, these feeders are another example of S-A engineering to provide continuous heavy duty handling at lowest cost-per-ton ... Whatever your bulk handling problem, S-A engineers with their complete line of bulk handling equipment units can help you find the right solution for efficient, economical operations.

STEPHEN S-ADAMSON
MFG. CO.

13 Ridgeway Avenue, Aurora, Illinois

Los Angeles, Calif., Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

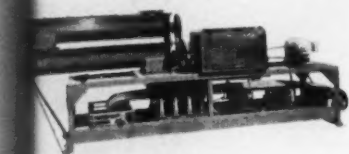
PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.

Automatic Weigher Feeds Fine Materials Evenly

The Sintering Machine Corporation has designed a new feed regulating transportweigher for automatically and continuously transporting, weighing, and maintaining the pre-set rate of feed of finely divided material.

Transportometer equipment weighs, totals, and regulates feed with an accuracy of 99% percent or better, regardless of belt speed or tonnage variations.



Units are available for a wide range of applications in continuous automatic weighing, totalizing, transporting, and feed regulation for installation on new or existing belt conveyors and between conveyors and milling equipment. More complete specifications will be sent those circling no. 69.

Licensing Expands On Aluminum-to-Steel Welds

Two newly-licensed firms now bring to eighteen the number of companies authorized to use the manufacturing technique of Fairchild Engine and Airplane Corporation's Al-Fin Division.

Al-Fin methods are the only successful applications of welding aluminum to steel, cast iron, nickel, and titanium. Most of the firms now using these techniques are in the diesel, automotive, electronic, and electrical fields. If you're interested in receiving additional information on the licensed firms or applications, circle no. 79.

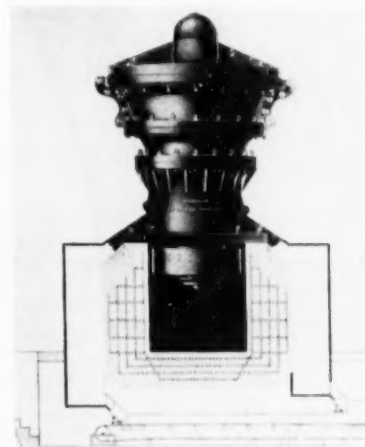
Booklet On Tractor Tools And Their Many Uses

Nearly all of the auxiliary equipment now available for crawler tractors is described in a new picture book published by the Hyster Company. The illustrated uses for such attachments as hoists, shovels, draglines, and the like, cover the fields of mining, construction, and logging.

Many small open-pit mines owe their profits largely to the fact that a single machine is doing the jobs of bulldozing, clearing, stripping, and mining. To find out how your operations can use the many tractor attachments that are being manufactured, circle no. 74.

Newly-Designed Gyrotory Features Improvements

The new Kennedy-Van Saun gyrotory crusher, available for either primary or secondary reduction, is designed for maximum efficiency, long life, and simplified maintenance. Among the many improvements it features are self-aligning roller bearings on all moving parts, recirculating forced-feed oiling, automatic power-



shut-off when oil pressure fails, starting torque of 250 percent and pull-out torque of 500 percent, and reductions to as fine as $\frac{1}{16}$ of an inch.

To prevent clogging by clay-bearing materials, a vertical drop of six feet separates the rock and clay; hard-to-crush rock and ore with as much as 50 percent clay can be handled without clogging. One of the most important design features to maintenance men is the ease and simplicity with which the lower plate can be raised, lowered, or removed by wire rope slung from an overhead crane—no hydraulic jacks are necessary. For further information, circle no. 65.

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New Booklet Describes Design, Layout of Dries

The Moore Company, manufacturer of locker baskets, has published a 16-page, illustrated booklet written for the design engineer, safety engineer, and consultant in changeroom problems. Architectural standards, dimensioning, equipment, and safety are emphasized, providing an easy reference for the planning engineer.

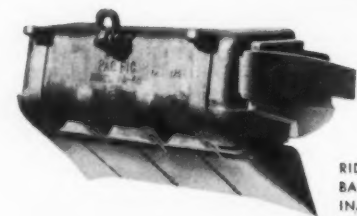
The format is in two sections, the first containing changeroom standards, and the second pertaining to designing dimensions and details. Several photographs and drawings of changerooms are included to indicate many of the methods in laying out the entire room. For a free copy, circle no. 80.



NEW PLANT OPENED BY LINK-BELT

Link-Belt Company recently opened a new seven-acre plant at Colmar, Pennsylvania for the production of custom-designed materials handling systems. An example of the type of equipment to be manufactured there is the ore-processing system Link-Belt will manufacture for the Orinoco Mining Company's Venezuelan operations. This system will have an hourly capacity of 6,000 tons and will provide for rail-car unloading, crushing, screening, storing, and ore-ship loading. The new Colmar plant is a completely-integrated manufacturing unit that will receive materials (largely steel) at one end and produce finished equipment ready for shipment at the other. Included among the Link-Belt officials at the dedication ceremonies in December 1952 were R. C. Becherer, president; L. J. Carson, general manager of the Colmar plant; and B. K. Hartman, Colmar sales manager.

Proved around the World



RIDES ON RUNNERS ON BACK-HAUL. THIS ELIMINATES UNNECESSARY WEAR, PROVIDES FOR LONGER SERVICE LIFE.

Pacific "Slushmaster" Scrapers are proving their dig-ability and stand-up-ability under almost every conceivable condition in all parts of the world—in the Philippines, Africa, South America, Mexico, the U.S.A. and Canada. The acceptance of these scrapers by mining companies everywhere is due to their design superiority.

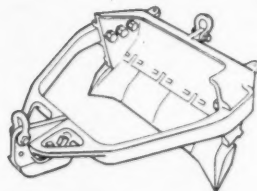
They dig in, secure a full load in a single pass and then carry it with less horsepower. Here are typical quotes from satisfied customers: "Best breast cleaning scraper ever designed,"... "It's the 'slushingest' bucket I've ever seen,"... "You have to see 'em work to believe it." Send for Bulletin No. 215 for complete information.

BE SPECIFIC—ORDER PACIFIC. For added efficiency, use Pacific Sheave Blocks, Sheave Anchors, "Round-The-Corner" Sheave Blocks, Jaw Crushers, Bit Knockers and Pacific Wearing Parts.



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RIDES ITS LOADS
Saves Horse Power



**CAN CHANGE BLADES
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UNDERGROUND**

Easy disassembly permits moving scraper into any working place.

**LOW CENTER OF
GRAVITY**

Practically impossible to turn over. Doesn't fish-tail.

DESIGNED FOR DIG-ABILITY

Digs in and gets a full load on a single pass, regardless of size or type of material or slope of muck pile.

SIZES TO SUIT YOUR REQUIREMENTS

Model	Size	Weight
2A	26"	398#
2A	30"	457#
2A	34"	485#
AB	36"	656#
AB	42"	698#
2B	36"	1240#
2B	42"	1346#
2B	48"	1432#
2C	60"	2275#

ALLOY STEEL & METALS CO.

FROTHER ALCOHOL EXPLAINED: A new technical bulletin on methyl amyl alcohol has just been released by Carbide and Carbon Chemicals Company, a division of the Union Carbide and Carbon Corporation. Among its other important uses, this material is receiving much attention as a superior frother in the flotation of certain non-ferrous ores. Get the full dope on methyl amyl alcohol—circle no. 1.

ONE MAN RIG WITH DRIFTER POWER: Consolidated Pneumatic's new CP-59 rock drill with 2 1/4-inch piston feedleg offers a combination long sought by mining men—a light-weight, one-man drill with the power and punch of a regular drifter. Get full details by circling no. 2.

MINERALIGHT YOUR WAY TO NEW DISCOVERIES: Ultra Violet Products' Mineralight instantly detects tungsten, mercury, and other valuable minerals. There's a model for every requirement. And if you'd like a specimen sample from the first atomic blast at Alamogordo, New Mexico, just send 25¢ to Ultra Violet Products, Inc., 145 Pasadena Ave., South Pasadena, California. A quick note to the same address will bring you the company's brochure MW "Prospecting for Scheelite (tungsten) with Ultra-Violet." Or you can get a copy by circling no. 3.

INSURE UNDERGROUND SAFETY: Edison hardhats, oxygen-generating respirators, and cap lamps are designed for years of dependable, un-failing service for increasing efficiency, production, and, above all, safety. Get a copy of Mine Safety Appliances' general mining catalog by circling no. 4.

COMPLETE DIAMOND DRILL SERVICE: The design and manufacture of Sprague and Henwood's diamond bits, reamers, barrels, and drills are backed by years of world-wide experience in actual diamond drilling operations. Their bulletin 325 covers briefly the equipment and many services they now offer. Circle no. 5.

NEW HOSE COUPLINGS GIVE SAFER SERVICE: Le-Hi Quick-Lock hose couplings and fittings couple and uncouple in less than a second yet guarantee safe, efficient service on air, water, gas, oil, or steam lines under pressures up to 2,000 pounds per square inch. A Le-Hi bulletin gives full details. Circle no. 7.

Circle numbers and mail this card for free product literature

To get further information on any item described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP card at the right, and mail. If mailed from a point outside the United States, proper postage must be used.

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NEW HEAVY DENSITY SYSTEM APPLIED: The new Wilmot-Daniels heavy density system differs from others mainly in its unique up-shot purging current. This successful application of basic theory has resulted in better efficiency, radical simplicity, and space-saving construction. Get Wilmot-Daniels bulletin HD-521 by circling no. 6.

NEW SCREENING PRINCIPLE: Hewitt-Robbins has developed a new vibrating screen based on their circle-throw principle. These units will handle heavier loads and give sharper, more accurate sizing. Full information on both single and double deck models is available. Circle no. 8.

CONTROL TRANSMISSION SYSTEMS: A new catalog describes completely the pneumatic, magnetic, electric, electronic, and electronic-follower transmission systems used in automatically measuring and controlling flow, pressure, liquid level, viscosity, and specific gravity. If you're interested in any of these, get Fisher and Porter Company catalog T-50 by circling no. 9.

DO YOU TRUCK CONCENTRATES? If you do, then you'll be interested in the new Autocar V-8. It features an all-new, low-weight, high-strength chassis powered by trucking's most modern power plant—the Autocar V8 valve-in-head, high-compression 200-hp. engine. For a copy of Autocar's descriptive bulletin, circle no. 10.

TRACKS TO PROFIT: Caterpillar has a new illustrated booklet out by that title describing the advantages of using the big yellow rigs where the going is rough and dependability is a requirement. To get a copy, circle no. 11.

BELT REPAIRS MADE EASY: The new Turtle conveyor belt fastener is designed for quick, simple belt repairing and joining. This new gadget, available in steel, monel, stainless, and everdur, requires only a mechanic's hammer. Need more details? OK, then circle no. 13.

CO DETECTION: Now that Diesel power is getting wider application underground, the detection of carbon monoxide quantities is of increasing importance. One of the better units on the market is made by Taller and Cooper. For a copy of T&C's latest bulletin on CO detectors, circle no. 14.

VERTICAL PUMPS: Allis-Chalmers has an engineering bulletin complete with graphs and tables on their small vertical pumps for both side-wall and submerged mounting. Circle no. 15.

BETTER BEARING SERVICE: Mechanical stability, resistance to breakdown, and longer service life have given Shell Oil's lithium grease wide applications wherever bearing lubrication is required. To get more information on how multi-purpose lithium grease has replaced over 20 standard products, circle no. 16.

PERTINENT POOP ON PLASTIC PIPE: Big savings in maintenance and installation have been made with mine-applications of plastic pipe. Triangle Conduit and Cable Company has a new 16-page book with information on flexible, semi-rigid, and rigid pipe—the hows and wheres and whys of its installation. Circle no. 17.

SIMPLE HARDNESS TESTS: Ernst portable metal hardness testers quickly and accurately test hardnesses within 1.5 points Rockwell or 5 points Brinell. They give direct readings on regular or irregular surfaces and are little bigger than a stop-watch. An Ernst bulletin is available; circle no. 19.

BETTER, CHEAPER CONCRETE: One answer to more durable, less permeable, lower-cost concrete is Pozzololith. Interested? Then circle no. 20.

GEARMOTOR DATA FOR ENGINEERS: A new book by J. D. Christian Engineers has been written to assist design engineers. It is complete with gearmotor dimensions, application data, prices, etc. For your copy, circle no. 21.

HOISTING HINTS: Latest literature on Lug-All hand-operated hoists and winches have many valuable hoisting hints to save time and manpower. Bulletin no. 279 also contains information on Lug-All's latest models and accessories. Circle no. 22.

FOR CHANGING BELT LENGTHS: Armstrong-Bray has designed a heavy-duty belt fastener specifically for heavy conveyor belts of changing length. They make a smooth, flexible joint of any width in belts up to 1/2-inch thick. A circular is available; circle no. 25.

FEBRUARY 1953

NOT GOOD IF MAILED AFTER APRIL 25

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SAMPLING IS OF THE ESSENCE: The economics of all mining is based on proper sampling. Check the latest in sampling methods and devices by getting Denver Equipment Company's sampling booklet, bulletin no. S1-B2, by circling no. 30.

TORQUE CONVERSION IN TRUCKS: Twin Disc Clutch Company's bulletin 501 describes simply but completely how torque conversion can increase mine output per production dollar and tells how to select the torque converter most suitable for each individual need. Get a copy by circling no. 32.

JAW CRUSHING BY TELSMITH: Smith Engineering Works' new bulletin no. 280 has a complete description of each of their nine outstanding jaw crushers, which range from 10 by 16 inches to 30 by 42 inches. For your copy, circle no. 31.

ALL-PURPOSE ROCK DRILL: Ingersoll-Rand is now producing an air-leg rock drill combination that can be used as a drifter, stopehammer or Jackhammer. The new drill, known as the JR-38 Jackdrill, is a completely integrated unit with a built-in air coupling between the drill and the feed leg—doing away with the necessity of a third hose. For complete information, circle no. 33.

AIR-POWERED MINE HAULAGE: Eimco's new two speed air motor locomotive is designed to increase the efficiency of air-powered transportation. Air pressure is transferred to the maximum possible tractive effort through the new transmission with which the unit is equipped. For further information circle no. 34.

FINE SCREENING, WET OR DRY: The new Symons V (as in vertical) screens are designed for extremely fine, single cut wet or dry separations. The units operate with a combination of centrifugal action and gyratory movement. Find out all about Nordberg's new screens by circling no. 39.

LEARN EFFICIENT FURNACE USE: Pittsburgh Lectromelt Furnace Corporation has published a new book on the many applications of electric furnaces. Be informed on the overall cost reductions possible with proper furnace use in both the ferrous and non-ferrous fields. Circle no. 40.

BLASTER BOOK: A new 20-page Atlas book contains a wide variety of valuable data on the applications and methods of Rockmaster milli-second delay blasting in pits and mines. Get a free copy by circling no. 41.

LONGER LIFE FOR MINE CABLES: Electric cables underground require the best possible insulation to stand up under the rough usage they get. Simplex cables with Anhydrex XX insulation have been successfully subjected to tests other materials failed to pass. To insure long cable life and better mine safety get further details on Anydrex by circling no. 42.

MINE CARS FOR HARD USAGE: Lake Shore Engineering Company has a wide variety of mine cars—all designed for rough handling and hard loading. Whether you're interested in Grandby-type, standard side dump, or man-trip cars, Lake Shore has them. Get the firm's latest information on the full line of Lake Shore mine equipment by circling no. 43.

HIGHER CRUSHER OUTPUT WITH LOWER POWER: Traylor TC crushers have exclusive self-tightening bell heads and curved concaves for maximum power efficiency. Get Traylor bulletin 126 describing all seven sizes of TC crushers from 20- to 60-inch feed openings. Circle no. 44.

BETTER AIRTUBE SUSPENSION: Rope seam suspension costs no more and offers the newest and quickest way of suspending Bemis Flexipipe. It eliminates special accessories and suspension wires—all that's required is a nail. For complete information and a free sample, circle no. 35.

NEED NEW FILTERS? If you do, check with the Winslow Engineering Company, pioneers of full-flow filtration, by getting the company's new booklet with full information on this filtering method. Circle no. 37.

SCOOP OF THE YEAR: That's what Lorain is claiming for the new front end attachment for their series TL-25. It's a truly unique mechanical 1 1/4-yard scoop shovel for surface and underground work. The scoop is mounted on telescopic dipper sticks that can be extended to 24 feet for digging and loading. Headroom is no problem and yet the bucket will dump at a height of 14 feet, if required. The unit

can be quickly attached to existing TL models and is interchangeable with other Lorain front end attachments. Circle no. 38.

SPRAY NOZZLES SIMPLIFY SCREENING: Deister's Concoco spray nozzles are simple to install and align. Just drill a hole in the pipe (from 1-inch to 4-inch) and clamp on the nozzle. To take full advantage of screening efficiency, get Deister's descriptive bulletin by circling no. 36.

LOWER YOUR V-BELT COSTS: Gates Rubber Company claims for their V-Rope v-belts the advantage of concave sides. This design is used to insure between the belt and the sheave groove more perfect contact than conventional belts offer. For a better explanation and more information, circle no. 45.

SINKER LEGS LOWER COSTS: As shown by actual production figures, the new Thor sinker leg gives up to 45 percent greater drill footage at far less cost. Get the full details on this Independent Pneumatic Tool Company development by circling no. 46.

CORE RECOVERY DEMANDS CUT TOM BITS: That's one of the basic theories on which Christensen Diamond Products Company operates. Christensen manufactures bits for maximum core efficiency by taking into account such things as the type of formation being penetrated. For further Christensen information, circle no. 47.

HEILINER HEADLINER: If you're interested in earthmovers, check some of the features on the Heil Company's new 197 models—positive "tilting floor" dumping, better safety at higher haul-road speeds with big 4-wheel brakes, patented Hydro Steer for easier, surer control, versatility with two sizes of tractors and interchangeable scrapers and dump wagons. Check on the new Heiliners by circling no. 48.

ISOLATED? Then you know how important dependable, trouble-free underground haulage can be to overall mine production. Whether or not you're in the market for new equipment, take advantage of Mancha experience and engineering by sending for their free "data record form." When filled out and returned to them, the form will be the basis of advice on your specific operating conditions and problems. Circle no. 49.

For Free Product Literature, see other side

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Femco Audiophone Systems Are Used in Mines, Mills

The Femco Audiophone, an improved and simplified method of electronically amplified voice communication, is offered by the Farmers Engineering and Manufacturing Company.

Femco phones are common talking systems, wired to order and consisting of press-to-talk, release-to-listen microphones and speakers at as many stations as are desired. Systems may be engineered to suit individual requirements for



private two-way conversation, or for enabling all stations to hear simultaneously.

Power may be drawn from a variety of alternating- and direct-current lines with simple plug-in attachments. Output ranges from 10 to 150 watts or more. By use of multiple amplifiers and boosters, extensive networks can be installed and coordinated. For a copy of Femco's bulletin 26, circle no. 70.

Portable Gasoline Hammer Described in New Bulletin

"A Profitable Tool with Many Uses" is the key line of a new bulletin, issued by the Barco Manufacturing Company, describing applications for the company's portable gasoline-powered hammers.

Because the Barco hammers are self-powered and require no compressor as an auxiliary, they can be taken easily and quickly to even remote locations for operation by a single man. New models



feature an improved ignition system for easy starting and stopping. Standard hammers deliver up to 1700 strokes per minute with a gasoline consumption of approximately a quart an hour. For standard and special applications, Barco offers a wide choice of tool bits and accessories. To get a copy of Barco's bulletin, circle no. 65.

Hydraulic Power Units Use Plant Air Pressure

A series of heavy-duty, air-hydraulic pumps and power units designed to develop high fluid pressure from low air

pressure are available from the Ledeen Manufacturing Company. These units develop fluid pressures directly from plant air supply and are suitable for operation of high pressure cylinders, clamps, valves, actuators, and hydraulic presses.

Built as a complete package unit ready for installation, the pumps and power units are available in horizontal construction for minimum head room, and vertical construction for minimum floor space. For further information, circle no. 77.

Half-Track-Mounted Shovel Has Greater Versatility

The new Quick-Way model L, a $\frac{1}{2}$ -yard shovel featuring a front dump dipper, is now available mounted on a Diesel-powered half-track. With Diesel shovel drive, the machine can be quickly converted with exhaust scrubbers for underground use.

Crowd, swing, and hoist movements are similar to those common to large pit shovels and, with the new mount, make

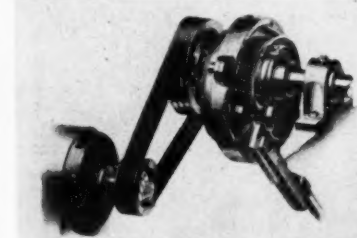


Quick-Way one of the most rugged and versatile shovels now available for mucking, stock-piling, and general plant and mine use. For further details, circle no. 66.

Shaft-Mounted Reduction Drives Mount Easily

A new series of 20 to 1 ratio speed-reduction units featuring important improvements in gears, bearings, housing, lubrication and oil sealing systems has been announced by the American Pulley Company, originators of shaft-mounted speed reducers.

The new units represent one of the most advanced designs in this type of reducer since they were first introduced twelve years ago. Gearing in these Shaft-King speed reducers consists of two trains of the single-helical type; all gears are



precision cut from alloy steel forgings and flame hardened.

Interchangeable patented split tapered bushings with locking nuts eliminate fretting-corrosion and make the units immediately and easily adaptable to any shaft size up to 3 $\frac{1}{16}$ inches. Only standard shaft lengths (twice shaft diameter plus clearance) are required for mounting. A new 20-page Shaft-King catalog is available. Circle no. 67.

Notes From The Manufacturers

The Harnischfeger Corporation has established a new wholly-owned subsidiary, the Harnischfeger Export Corporation, to handle sales and distribution of all P&H products in the Western Hemisphere except in the United States. The new firm is headed by R. F. Herr.

Frank E. Briber, Jr. has been named manager of Allis-Chalmers' newly-formed crushing, milling and mining machinery section. Mr. Briber, who has been with A-C since 1946, received his bachelor of science degree in metallurgy from the Massachusetts Institute of Technology. Other department appointments include: R. C. Edwards, engineer in charge of research and development; N. E. Croft, sales engineer in charge of the crusher group; C. A. Rouland, sales engineer in charge of the rod and ball milling group; E. M. Bolstad, sales engineer in charge of miscellaneous mining equipment and coordinator of projects for the mining industry; D. F. Carlson, product engineer of the pyroprocessing section; and A. J. Roubal, special engineer.

Herman J. Daniels, president of the H. J. Daniels Company, Inc., Hazleton, New Jersey, is head of the new Heavy-Density Division of Wilmot Engineering Company. Wilmot recently acquired the Daniels-Roller heavy-density process, and Mr. Daniels will supervise the manufacture of the newly-named Daniels-Wilmot heavy-density units, now in use in the anthracite fields of Pennsylvania and in Alabama's iron ore country.

Robert W. McLean has been appointed Pacific Coast market development representative for the Westinghouse Electric Corporation, with headquarters in San Francisco. He is a former market analyst in Westinghouse's market planning department, East Pittsburgh, Pennsylvania.

John S. Conway has been appointed vice president in charges of sales, and John E. Chadwick was named sales manager of the Koehring Company of Milwaukee. Mr. Conway fills a vacancy created earlier this year when Julien R. Steelman became president of Koehring. Mr. Chadwick previously was assistant sales manager, and more recently was western sales manager for a Koehring subsidiary, the Kwix-Mix Company.

Le Roi Company, Milwaukee manufacturer of portable air compressors and internal combustion engines, has integrated its plant and industrial engineering departments under the supervision of Wesley A. Schaefer. He will be manager of the new industrial and plant engineering department, and will work with Walter V. Sovitzky, chief industrial engineer for the new combined department.

M. R. Lange is new distributor sales manager for the Rogers Iron Works Company of Joplin, Missouri. He previously was assistant sales manager for Lippmann Engineering Works, and will be in charge of all domestic and foreign distributor sales. V. H. Nixon, chief engineer, will continue to direct sales of equipment to the mining industry.

Buy Safe! Don't gamble

on just any shuttle car cable—

you may lose



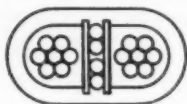
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Reserve Sells Bonds for Taconite Development

Reserve Mining Company has sold \$148,000,000 worth of first mortgage 4½ percent bonds, due in 1980, to a group of life insurance companies. While the names have not been revealed, Metropolitan Life Insurance Company and Equitable Life Assurance Society have been mentioned most frequently as leaders of the lending group.

The money will be used to develop the large taconite deposit located at the east end of the Mesabi Range in Minnesota. Experimental runs are already being made at the 300,000-ton pilot plant built at Babbitt, Minnesota, and construction is underway on the 3,750,000-ton plant at Beaver Bay, Minnesota. Later developments are expected to increase the plant's capacity to about 10,000,000 tons annually.

Republic Steel Corporation and Armco Steel Corporation are partners in Reserve. The entire operation is expected to be finished in 1957, but some sections may be in operation by 1955.



The White Pine Copper Company is planning to install the world's largest classifiers at its new 10,000-ton-per-day copper flotation mill at White Pine, Michigan. Twelve 84-inch Wemco SH Classifiers will operate in closed circuit with six 12 by 13-foot Marcy ball mills in the closed grinding-classification circuit. The flotation section will consist of 96 rougher, 108 scavenger, and 48 cleaner 66-inch Fagergren machines.

The Aluminum Ore Company plans to build a major addition to its new alumina works at Bauxite, Arkansas. Estimated to cost more than \$5,000,000, the new facilities would be for manufacture of finished chemical products from alumina processed from bauxite mined in Arkansas. Grading of the land for initial units is expected to begin in the spring. Aluminum Ore Company is a subsidiary of the Aluminum Company of America.

The Mid Continent Mining Corporation of West Plains, Missouri has engaged the Western Knapp Engineering Company, a subsidiary of the Western Machinery Company, to design and engineer the installation of a used 60-ton-per-hour HMS plant at its open-pit Alice zinc-lead mine. The company will produce zinc under a DMPA floor price contract. The contract calls for delivery of 7,400 tons of zinc at a price of \$0.16 per pound with production scheduled to start in April 1953.

The critical need for nickel prompted the aeromagnetic survey of a 1,000-square mile area in Lake County, Minnesota, by the U.S. Geological Survey. A

preliminary aeromagnetic map has now been placed in files open to the public. The mapping shows the gabbro contact along which the nickeliferous deposits occur, together with the eastward extension of the Vermilion Iron district and the western end of the Gunflint Range in Cook County.



St. Lawrence Fluorspar, Inc. has signed a design and construction contract with the Western Knapp Engineering Company, division of Western Machinery Company, for a 300-ton-per-day fluorspar flotation mill at Wilmington, Delaware. The plant is scheduled for operation in mid-1953 under the terms of a contract with the DMPA calling for delivery of 150,000 short tons of acid-grade fluorspar in the next four years. The flotation plant will treat the sink product from the new HMS plant operated by the St. Lawrence Corporation of Newfoundland, Ltd. at St. Lawrence, Newfoundland.

The National Lead Company has acquired additional acreage adjoining its present property near Jacksonville, Florida, where it mines sands bearing ilmenite, rutile, zircon, and monazite. Hum-

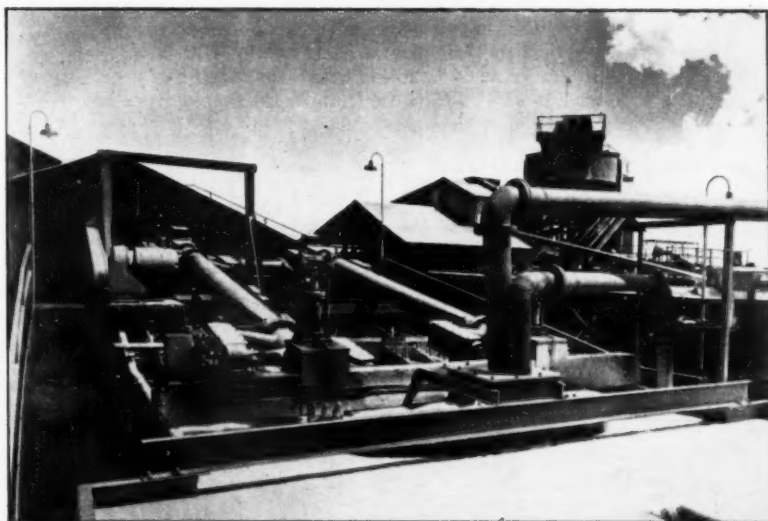
phreys Gold Corporation carries on the mining operations for National Lead.

Zinc production has been halted at the Hutson mine near Salem, Kentucky, operated by the Alcoa Mining Company, a subsidiary of Aluminum Company of America. Current low prices for zinc have rendered operations unprofitable. Annual production was about 5,000 tons of zinc ore, with most of the metal going into alloys made by Alcoa. The 70 workers employed at the mine will be absorbed in the company's fluorspar operations in the same area.

Miami Copper Company has formed a new subsidiary, Adolph Lewisohn Selling Corporation, to handle sales of Miami's copper and molybdenum. Formerly, this was done by Adolph Lewisohn & Sons, Inc. Personnel of the new firm will be substantially the same as that connected with the old firm. A. H. Singer will continue as sales manager.

The first pilot plant to recover ferromanganese from open hearth steel furnace slag will be built by Mangaslag, Inc. of Fort Worth, Texas. Production will be at the rate of 1,000 long tons a month. Completion of the plant, which will be located at Coxtown, Pennsylvania, is expected within the year.

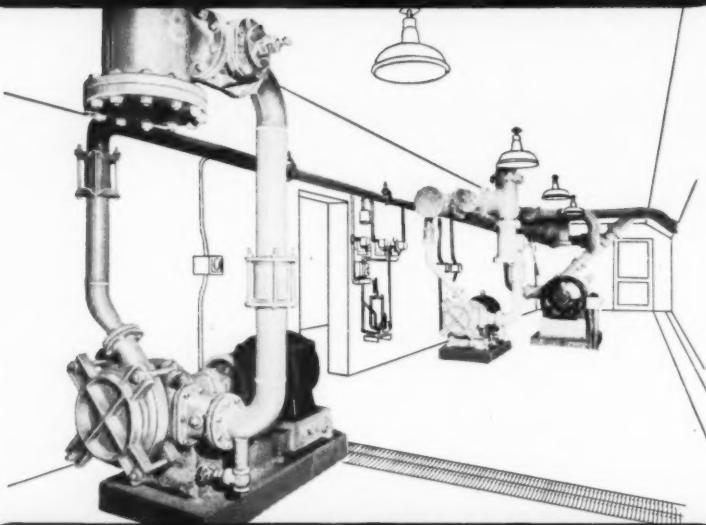
The Freeport Sulphur Company is reported to be exploring sulphur deposits found in conjunction with iron ore deposits in Maine. A crew from Freeport Sulphur is exploring the property which is near the old Katahdin Iron Works property in which General Chemical Corporation, a subsidiary of Allied Chem-



RECOVER FINE PHOSPHATE PARTICLES

Installed at the new Tenoroc mine of the Coronet Phosphate Company, near Lakeland, Florida, is this 16-foot-wide by 36-foot-long Dorr HX Classifier. The photo above is taken across the extended, flared pool at the overflow end, which is designed to provide extra settling area to recover minus-65-mesh, plus-150-mesh material. Feed averages approximately 35 percent solids and an average of 235 tons per hour of dry solids is currently being handled. The mine is in the pebble rock phosphate district.

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little or no maintenance

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ical Company, has invested more than \$2,000,000.

S. A. Montague has bought out all of the assets of the Spruce Pine Mining Company in Spruce Pine, North Carolina, including the name. He had been operating the company for some time under a lease arrangement.

A supply peak of 1,040,000 tons of iron ore was stockpiled at Erie Railroad's storage dock at North Randall, Ohio for the 1952 season. The dock passed its million-ton mark despite the long period of inactivity when the nation-wide steel strike was on. (No domestic ore was unloaded at North Randall from June 20 to August 2.) Steel mills in Warren, Niles, Youngstown, Sharon, and Pittsburgh will draw from this stockpile during the winter months.

Kaiser Aluminum and Chemical Corporation has completed the first phase of its huge primary aluminum works at Chalmette, Louisiana, with the start of operations in the plant's fourth potline. The plant will supply an additional 12 percent more aluminum than it had been producing at the beginning of the year. Construction is also progressing on the second phase which is to double the capacity of the plant as rapidly as possible. Unless there are unforeseen delays, the company expects to have eight potlines in operation by next summer, with an annual capacity of 400,000,000 pounds. Continuous operation will not be affected by the current hydroelectric power shortage since Louisiana's gas reserves will serve as the plant's source of power. Kaiser is building one of the largest privately operated steam plants in the world, with a capacity of 370,000 kw.

The Achan mine of International Minerals and Chemical Corporation's Florida phosphate division, has been closed down. Men and equipment have been transferred to other corporation operations.

In anticipation of increased imports of iron, manganese, chrome, and other ore coming from the new developments in Labrador, Venezuela, Brazil, and Liberia, and also to handle larger imports from Sweden, Yugoslavia, Turkey, Africa, and the Far East, ore unloading facilities of the Canton Railroad in the Baltimore harbor are being expanded and modernized. When completed, the plant will have a maximum rated capacity of 3,000 tons an hour, about double present tonnage. A giant conveyor system, designed and installed by Robins Engineers Division of Hewitt-Robins Inc., will speed the ore from ship to shore at the rate of 50 cars an hour.

Three preliminary total-intensity aeromagnetic maps of part of the New York-New Jersey Highlands have been placed in open file by the U.S. Geological Survey. The survey was made for the purpose of aiding in the location of new iron ore deposits.



The Mountain Iron mine at Mountain Iron, Minnesota ended its shipping season on December 7. A small stripping and rock clean-up program will be carried out through the winter months. Since the

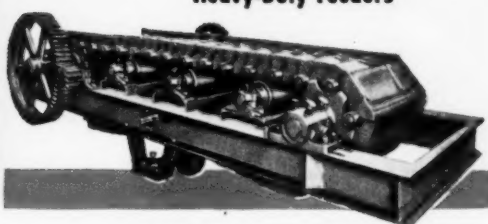
MINING WORLD

TELSMITH

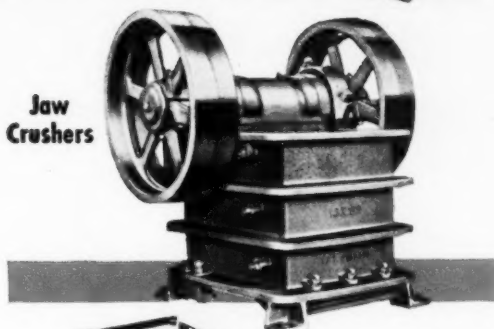
feeding
coarse crushing
screening
fine crushing

EQUIPMENT FOR MINES

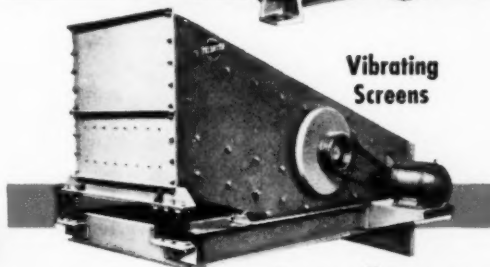
Heavy-Duty Feeders



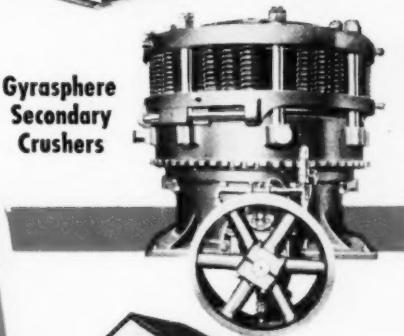
Jaw
Crushers



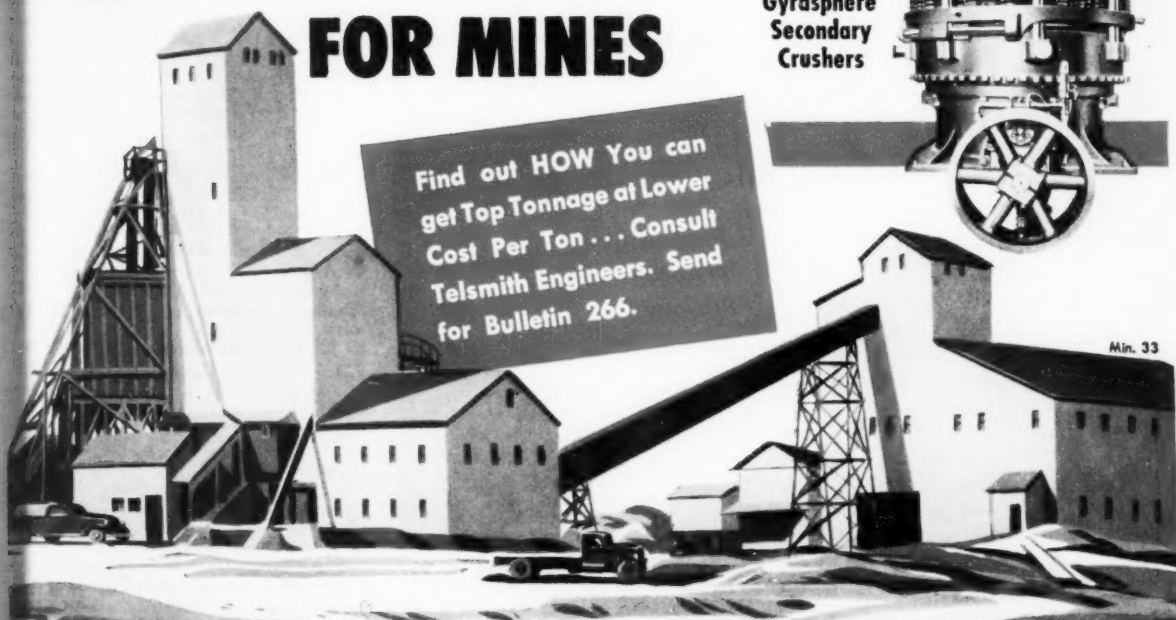
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Min. 33

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Mountain Iron mine is not participating in the all-rail winter ore shipping schedule, employees are on a five-day week for the first time since the *Oliver Iron Mining Division* reopened the mine in 1942. This schedule may be changed in the spring when Oliver's new taconite plant is completed and ready for year-round operation.

Piers for the washing plant, screening plant, and pump-house at *M. A. Hanna Company's Patrick "C"* mine have been completed. The new buildings will be constructed of steel from the old *Galbraith* mine washing plant. The new plant will be ready for the 1953 shipping season.

The *Montreal* mine at Montreal, Wisconsin, farthest west of the active mines

on the Gogebic Range, loaded its last boat on November 18, and has been stockpiling its production since then. The *Montreal* is sinking an internal hoisting shaft which, when completed in 1954, will be 4,250 feet below the surface.

The *Oliver Iron Mining Division* has an extensive stripping program planned for the winter months. Seven mines in the Virginia-Eveleth district, six in the Hibbing-Chisholm district, and five in the Canisteo district will participate, as will the company's "Pilotac" taconite mine at Mountain Iron, Minnesota. Ira O. N. Swanson, of Virginia, Minnesota, is general superintendent of the eastern district; John H. Hearing, Jr. of the Hibbing-Chisholm district; and E. A. Friedman of the Canisteo district.

Work at *Pickands Mather & Company's* new *Peterson* mine at Bessemer, Michigan, is progressing according to schedule. The new shaft is down over 2,000 feet, a new engine house has been completed, and hoists are being installed, while the warehouse and office building is almost finished.

The Menominee Range on the docks at Escanaba, Michigan closed on December 3, with a total tonnage rate for 1952 of 5,506,431 tons shipped through these facilities. Because of the steel strike, the figure was lower than in 1951. Regular winter renovation of the docks began at once. The *Chicago & Northwestern* expects to spend about \$410,000 in relining and repairing chutes, renewing dock timbers, and other work.

Revised goals for various metals have been announced by the Defense Production Administration. An increase in the expansion goal for nickel should provide a total annual supply of 190,000 short tons in 1955. The revised goal, which includes both domestic and imported production, represents an increase of 58,000 short tons over an earlier goal of 132,000 short tons announced for 1954. The revised goal for zinc has been set to provide 1,245,000 short tons in 1956; the revised goal for synthetic cryolite will supply 69,000 net tons in 1954. To provide the latter amount, it will be necessary to increase production capacity by a total of 46,600 net tons. The annual supply of mercury has been set for 80,000 flasks in 1953 and 1954. The goal for the U.S. supply of rare earths containing 50 percent rare earth oxides, has been set at 7,000 net tons per year in 1955. This represents an increase in annual supply from both foreign and domestic sources, of approximately 4,600 tons over the supply in 1950. Rare earths are a group of 15 minerals procured from monazite and bastnasite sands. An interim revision of the expansion goal of molybdenum ore and concentrates has been established at 70,000,000 pounds of U.S. production in 1954, measured in terms of molybdenum content. This represents an increase of 12,000,000 pounds over the goal announced early last year, for the beginning of 1955.

The *Plymouth* mine, the only open pit on the Gogebic Range in Michigan, has closed down after 37 years of operation. The last car of ore from this *Pickands, Mather & Company* property was loaded on November 6, 1952. In 1951 the mine shipped 223,027 tons. E. C. Sponberg has been superintendent of the mine for many years. Dismantling of the *Plymouth's* equipment is under way.

The *Rabbitt Lake* mine at Cuyuna, Minnesota on the Cuyuna Range, operated by *Pickands, Mather & Company*, began shipping in May, 1952 after having been stripped by dredge and shovels and has made a substantial contribution to 1952's production. *Pickands' Danube* mine finished its 1952 season on October 27, and began at once on a winter stripping program.

The *Chicago & Northwestern Railway Company* has placed an order with *Bethlehem Steel Company* for 100 70-ton iron cars at a cost of \$6,500 each. This is in addition to 300 similar cars previously ordered and scheduled for delivery in the spring of 1953. The two on the docks of *Chicago & Northwestern* at Escanaba, Michigan, set a record in September by shipping 1,020,399 tons of ore—the first time that Escanaba has ever exceeded a million tons in one month.



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Uranium Sampling Report Issued By Survey Group

A comprehensive report covering a survey of all phases of uranium ore sampling as practiced by the major ore buying stations on the Colorado Plateau has been issued by the Grand Junction office of the U.S. Atomic Energy Commission. The survey was undertaken by the Colorado School of Mines Research Foundation, Inc., under a contract with the AEC, to establish whether or not inequities existed in uranium ore sampling practices, to determine preferred methods of sampling that would reduce possibilities of error, and to make definite recommendations for improving uranium ore sampling procedures.

The survey indicated a wide difference in sampling procedures at various operations. Deviations from accepted standards of good sampling procedure were observed, although the survey disclosed no intentional tampering with sampling devices or other irregularities in the sampling procedure which might be intended to deliberately defraud the buyer or seller of uranium ores.

In certain plants, present sampling procedure seems to have been developed years ago during a period when uranium production was relatively unimportant and a high degree of sampling accuracy was unnecessary. Sometimes the ore producer has benefited from these practices, and at other times the ore buyer has received the benefit.

The report contains detailed descriptions of each sampling unit studied, and the companies concerned have been furnished with copies of the report. Also included is a description of a hypothetical sampling unit that embodies all of the requisite features of good practice under conditions such as those which exist in the Colorado Plateau. Copies are available at the Grand Junction Operations office.

Colorado Miners Sponsor National Minerals Meeting

The National Minerals Conference for 1953 will again be sponsored by the Colorado Mining Association and held in Denver, Colorado on February 12, 13, and 14. The Conference will first consider the immediate problems of the lead and zinc industry, and will take definite steps toward their solution. Representatives from all sections of the lead and zinc industries were invited to attend this working conference of mining men. Preliminary discussions of the proposals will be made prior to the meeting with representatives of Federal agencies and the legislative branch of the Federal government. It is the plan of the committee in charge of the conference that the industry will be able to unite at this conclave.

The United States Gold Committee will make a report on its activities and findings, and will make recommendations.

tions for united action during the 83rd session of Congress. U. S. Senator Homer E. Capehart, who addressed the conference last year, as Chairman of the Banking and Currency Committee of the U.S. Senate, has again been invited, as has Congressman Jesse P. Wolcott of the House Committee of the same name.

Recent attacks upon the mining land laws will be given a thorough going-over by both top-flight mining representatives and representatives from other land users.

Harold A. Krueger, manager of the Fredericktown, Missouri operations of National Lead Company, will speak on "Recent Metallurgical Developments in the Chemical Field." Brymer Williams of the Mining and Metallurgical Department of the University of Michigan will discuss "Chemistry's Contribution to the Mining and Metallurgical Industries." Felix Wormser, vice president of the St. Joseph Lead Company, New York, New York will present a paper on an Equalization Tax Program. A representative of the Colorado Fuel and Iron Corporation will speak on the minerals needs and requirements of the steel industry.

Technical sections are being included in the 1953 conference for the first time. Top-flight papers on fluorspar, bentonite, barite, and feldspar are on the agenda. A speaker will touch upon "Resources for the Future," and a panel is being arranged for a comprehensive discussion of how best to cope with the problem of

the proper use of streams in western mining operations.

A committee of over 100 mining men is working on the 1953 conference under program chairman Harrison S. Cobb of Boulder, Colorado. The dates for the conference have been carefully timed this year to allow for United States Senate confirmation of new governmental officials so that they can make their first public pronouncements to the mining industry at the conference.



American Cyanamid Company will build and operate for the U.S. Atomic Energy Commission a pilot plant at Grand Junction, Colorado to develop new and cheaper methods for extracting uranium from ores found in the West. Operation is expected to begin March 1 under the direction of Roy Hollis, a transfer from American Cyanamid's Watertown, Massachusetts laboratory. A staff of about 25 engineers, technicians, and operating personnel will be required to operate the plant, which will have a daily capacity of from six to ten tons of ore. Processes to be tested include ones developed



CADWELL PAYS FIRST DRAINAGE ROYALTY

The Cadwell Mining Company, which operates the Hayden shaft pictured above, was the first firm in 1952 to pay a "drainage royalty" to the government for use of the recently completed Leadville drainage tunnel. The tunnel, which drains the mine workings of several adjoining properties, is connected to the Hayden shaft by a 150-foot U.S. Bureau of Mines lateral. Cadwell, which has headquarters in the Leadville mining district of Lake County, Colorado, has been developing the Hayden since late 1950, and made its first shipment of mill grade lead-zinc-silver sulphide ore to the Resurrection Mining Company's custom unit a few months ago. A total of \$89,922, half of which was financed by a DMEA, has been budgeted by the company to aid exploration.

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through research in the Raw Materials Development Laboratory in Watertown, plus handling of ores which cannot be milled at present.

Drifting is underway on the 10,700-foot level of the old *Wheel of Fortune* lead-zinc-gold mine near Ouray, Colorado. M. Campbell Dann, manager of the *Revenue* mine which owns the property, says that plans call for enlarging and extending the old Anglo-Saxon crosscut 800 feet from the *Revenue* tunnel. From the 10,700 drift, a raise will be driven to the 1,150-foot level or further, in the hope that a rich zinc ore shoot like the one encountered at a similar horizon in the famous Camp Bird workings will be found.

The *Dante Exploration Company*, now leasing the *Cresson* gold mine at Cripple Creek, Colorado, has taken grab samples from the 17th level which run from 0.46 to 4.64 ounces of gold per ton, with the best gold assay also showing 37.46 ounces of silver. The *Tribby* dike and a phonolite dike were recently cut, and a drive made for about 30 feet north on the *Tribby* with mineralization becoming increasingly good.

In preparing to sink a winze to a depth of 220 feet, the operators of the *Lead Carbonate* mine at Gladstone, Colorado drove a drift from the Number 2 level to the bottom of the present winze and intersected the vein on which the winze is to be sunk. Assays of this vein show 41.8 ounces of silver, 12.8 percent lead, 2.6 percent copper, and 4.6 percent zinc. The gold values are about the same as experienced in the upper workings of the mine, but since they are spotty, an average of 0.30 ounce is taken for the vein, which is about 4 1/2 feet wide. Amos Jaramillo, Raynal Jaramillo, Fred Garcia, and Glenn Rhodes are now operating the property on a split-check lease basis from the *Bonita Mining & Developing Company, Inc.* of Silverton, Colorado. H. P. Ehrlinger of Silverton is *Bonita* vice president and general manager, and is directing the work of the lessees.

During 1952 shipments of lead-zinc-gold-silver custom ore to the *Shenandoah-Dices Mining Company's* mill at Silverton, Colorado formed a substantial part of the tonnage milled by the company. Among the leading custom shippers were the *Old Hundred Mining Company* from its *Garry Owen* mine; the *Pride of the West Mining Company* from the *Pride*, *Old Green Mountain* and *Great Eastern* mines; the *Bonita Mining and Development Company* from the *Lead Carbonate* mine; C. H. Carlton and associates from the *Galena Queen*; W. H. Erickson from the *Columbus* and *London* mines, and *American Zinc, Lead and Smelting Company* from the *Caledonia* mine.

SOUTH DAKOTA

The *Ellen-Jay Mining Company* of Rapid City, South Dakota was recently granted a charter of incorporation. Directors of the company, which was capitalized at \$25,000, are Neil P. Brennan and Lucile G. Brennan of Gering, Nebraska, and Jerry G. Brennan of Rapid City.

The 1952 net earnings of *Homestake Mining Company*, Lead, South Dakota, are expected to drop between \$300,000 and \$400,000 as compared to 1951 earnings of \$4,450,732. Payment will be between \$2.05 and \$2.10 per share. \$2.22 per share was paid in 1951. The company reports that prospects are good for an improvement of earnings in 1953 with more miners working, efficiency being increased, and labor-saving equipment promising to cut wage outlays and other costs. *Homestake* now has 1,750 men at work in Lead, of whom about 900 are employed underground. This represents an appreciable increase over the 1951 payroll, and production has been steadily expanding every quarter.

The new ore buying station for the U.S. Atomic Energy Commission at Edgemont, South Dakota is now purchasing uranium-bearing ores on the following terms: (1) Carnotite-type or roscoelite-type ores will be purchased in accordance with the prices, conditions and specifications of Domestic Uranium Program Circular 5, Revised. (2) Carnotite-type or roscoelite-type ores containing lime (CaCO₃) in excess of 6 percent will be purchased under special contracts with individual producers who follow the price schedule of Circular 5, Revised, but with appropriate deductions to compensate for the higher treatment cost of such ores. (3) Other types of uranium-bearing ores may be purchased under contracts with individual producers. Terms will depend on the metallurgical characteristics of the ore. The Edgemont station will be operated under contract for the Atomic Energy Commission by the *American Smelting and Refining Company*, and will accommodate miners in southwestern South Dakota and northeastern Wyoming.

UTAH

The new haulage tunnel at the *Bingham Canyon* mine of *Kennecott Copper Corporation's* Utah Division is nearing completion. It is 7,042 feet in length and is about 80 percent concrete, with timbering in the remaining portion which extends into the mineralized zone. The tunnel was constructed to provide transportation directly into the pit for empty ore cars and return loads, obviating the previous practice of hauling ore up from the lower levels. The tunnel has been driven and will be ready for use later this year when the track has been installed and electrification facilities are completed. Ore production at the *Bingham Canyon* mine in 1952 reached a postwar high of 32,000,000 tons of low-grade ore which, with 44,000,000 tons of waste overburden, made a total of 76,000,000 tons of material moved during the year. The ore production record was established in 1943 when 35,000,000 tons of low-grade ore were removed. In addition, remodeling of the electrical systems at the *Magna* and *Arthur* mills and the revamping of the flotation departments were begun last year.

Howe Sound Company has produced a substantial amount of cobalt at its Garfield, Utah refinery since December 1, 1952, and company engineers are grad-

MINING WORLD

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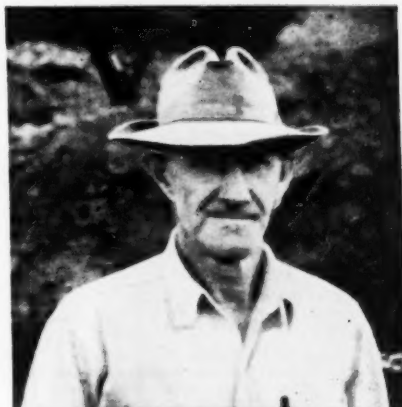
The way Mr. Walls tells it,

"We got into big time coal stripping when we put these fast powerful TD-24s to work. We soon found our production of coal about five times what it used to be, yet our labor in the mine was the same as it was before."

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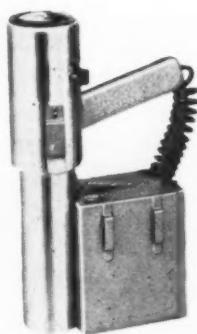
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ually eliminating the technical problems holding up full-scale production. One problem which they now face is whether air under pressure can be substituted for pure oxygen at one point in the revolutionary Chemico method of producing cobalt metals from concentrates.

Sealed bids have been opened by the Exploration Division, U.S. Atomic Energy Commission, for 40,000 to 75,000 feet of diamond drilling in the White Canyon area of San Juan County, Utah. The lowest bidder will supply all specified labor, materials, and services for the drilling.

According to Charles A. Steen, chief geologist for the *Utex Exploration Company*, a four-foot vein of pitchblende ore assaying 5.08 percent U_3O_8 and 9.81 V_2O_5 has been found at the bottom of a 73-foot shaft sunk by the company at the Big Indian area nine miles south of LaSal, Grand County, Utah.

New Park Mining Company at Keetley, Utah has completed the installation of its new \$100,000 underground main hoist, which will service the three-compartment Mayflower shaft. The two-compartment unit, to provide for the exploitation of ore reserves below the 1,500-foot level, has a capacity of 21,500 pounds down to 3,000 feet. Its rope speed is 1,000 feet per minute. An entire wall of the hoist room, which is 44 by 30½ feet and 19 feet high, was built up of concrete. Later, concrete was forced between the wall and the native ground. The wall was then sprayed with concrete emulsion to reduce seepage of water through the hoist room liner, and an Aquella paint was then placed over the concrete to insure even greater dryness.

A group of capitalists headed by Henry A. Whitley and L. E. Shale of San Francisco have leased over 100,000 acres on an adjoining Upheaval Dome in Grand and San Juan counties, Utah for the purpose of developing uranium ore on oil lands. In addition, the *Great Basin Oil & Leasing Company* and the *Mayflower Company*, holders of oil and gas claims in the area, have acquired valid mineral claims which were located before any oil and gas filings. These companies are now at work under the supervision of Lawrence Magliaccio building roads and moving in machinery preparatory to shipping uranium ore from their holdings.

The Defense Minerals Exploration Administration recently granted *West Park Mining Company* an \$8,010 loan to assist the firm in proving downward extension of its Quarry vein, which previously has been explored only at near surface levels. Thus far, seven railroad cars of copper ore have been shipped from the new workings, which are located east of Provo, Utah. Average assays of the shipment, coming from a 30-foot drift and a 70-foot raise east of the tunnel, were 6.78 percent copper, 0.0515 ounce gold, and 1.57 ounces of silver per ton. West Park's contract with the DMEA provides for the extension of a 500-foot adit an additional 50 feet, and for drifting both east and west 450 feet. At the latest report, only 250 feet of drifting west of the adit remained. In addition, mineralization has been found in a west drift (a 30-foot raise). According to Leon Newren, secretary of the firm, a winter shutdown may be forced by deep snow at the 8,700-foot operational elevation, but he said that mining will continue as long as weather is favorable. Total cost of the new program is \$16,200.

Geologic maps of part of the uranium-

producing region of the Colorado Plateau have been placed on open file for public inspection at the Geological Survey Office, 504 Federal Building, Salt Lake City, Utah. The maps consist of a set of planimetric geologic maps of forty-one 7½-minute quadrangles in southeastern Utah, southwestern Colorado, and northeastern Arizona. Each quadrangle covers between 55 and 60 square miles. Other distribution points include: Geological Survey, Atomic Energy Commission, Office of General Junction, Colorado; and Geological Survey Information Office, 468 New Castle house, Denver, Colorado.

WYOMING

Two thousand tons of manganese ore iron ore mined at the *Catches and Parners* mines in the Bear Lodge Mountains are being stockpiled near the Upton, Wyoming railroad yards for shipment to Utah.

Lode claims for uranium exploration in Campbell County, Wyoming reached a total of 740 recently. H. Wayne Ashcraft of Casper, landman for Jenkins and Hand, filed 112 claims on 2,240 acres. Others filers include *Black Butte Plateau Mining Company*, W. Don Quigley and George H. Gaul of Salt Lake City, Robert H. Miller of Los Angeles, *Jenkins and Hand*, Graham B. Campbell, and *McGee Oil Industries*.

A plan for the reorganization and expansion of the Wyoming Natural Resources Board was considered recently at a pre-legislative meeting of members. The proposal would establish four divisions, with a manager for each.

Construction and rehabilitation work on the experimental alumina plant at Laramie, Wyoming is very nearly completed, and several five-day runs in a small pilot unit have already been made. The Laramie operation will determine whether the lime-soda-sinter process can be used to recover alumina commercially from Wyoming's abundant reserves of anorthosite, an aluminum silicate rock. The program is a major phase of the U.S. Bureau of Mines' attempt to develop industrial processes for producing aluminum from domestic raw materials thus freeing the United States from substantial dependence upon imported bauxite. Preparatory work included construction of a 75-ton-an-hour crushing unit, installation of a purification system, modification of the fuel system to permit firing the kilns and boiler plant with either oil or pulverized coal, and general rehabilitation of plant and equipment. The plant had stood idle since the Defense Plant Corporation's discontinuation of construction in 1946.

J. Elmer Brock, president of the Wyoming Natural Resources Board, reports that a deposit of tungsten has been found in southeastern Johnson County, Wyoming. According to Mr. Brock, the full extent of the deposit will not be known until it is core drilled. However, placer claim locations have been filed by Lyle Ramsbottom, Vance Sackett, Kelly Howie, and Pete Christensen, local ranchers. The deposit is on state land near the eastern face of the Horn Mountains.

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Eureka Gets DMPA Loan To Unwater Nevada Mine

A DMPA loan of \$750,000 has been made to the Eureka Corporation, Ltd. to assist in the unwatering of its flooded lead-zinc mine at Eureka, Nevada. The loan represents about one quarter of the estimated cost of unwatering the 2,500-foot Fad shaft which was flooded early in 1949 bringing all operations to a standstill.

Eureka Corporation actually leases the property from the Richmond-Eureka Mining Company, a subsidiary of the United States Smelting and Refining Company. Richmond's stockholders have had to approve an amendment to the lease consenting to certain provisions of the government contract, and extending the term of the lease from 1977 to the year 2,000.

Ventures, Ltd., principal stockholder in Eureka, has guaranteed the performance of Eureka to the DMPA and has assured the agency that additional funds sufficient to make up the \$2,500,000 to be spent by Eureka will be forthcoming. The government may cancel the contract at any of five specified dates during the 25-year unwatering program, or if it feels further operations are unjustified. Repayment of the loan will be out of production.

San Manuel Copper Gets Rapid Tax Amortization

The San Manuel Copper Corporation of Superior, Arizona has received two rapid tax amortization certificates from the Defense Production Administration authorizing the company to write off from 40 to 75 percent of \$71,228,500 worth of copper and molybdenum mining facilities over a five-year period.

The facilities, to be located near Mammoth, Arizona, include a \$9,000,000 power plant, a \$7,500,000 railroad, and \$54,000,000 worth of mining equipment, surface mill facilities, smelting facilities and equipment, and power plant equipment.

Last July, the Reconstruction Finance Corporation granted San Manuel a loan of \$94,000,000 to undertake the copper-molybdenum project at Mammoth, where one of the largest copper deposits ever discovered in the United States is contained. Last fall the Defense Materials Procurement Agency granted the company a floor-price purchase contract guaranteeing a market for 365,000 short tons of electrolytically refined copper and 16,060 short tons of molybdenum contained in concentrates. Full production should be reached in 1957 or 1958.

Plan Proposes Oilmen Check For Uranium

The U. S. Atomic Energy Commission and oilmen are working together on a plan to consolidate the hunt for oil and

uranium, thereby employing the oil industry's 10,000-man exploration crews in a search for the vital uranium.

Radioactive rays penetrate only a few feet of solid rock so that shallowly buried deposits could easily be overlooked. However, oil explorers drill over 4,000 shallow test holes each day in the United States and Canada which could be checked. It has been suggested, work behind the oilmen with radioactive detection instruments checking and therefore, that a special follow-up crew measuring these test holes.

There are several other methods whereby a check could be made for both sources at the same time. For example, material removed from the first 500 feet of oil well hole could be checked. Oil geologists could carry detection devices. The gamma ray log, a radioactive measuring device, used in oil well drilling, could check the first 500 feet of drilling, and all oil industry engineers and technical people handling gamma ray logs could watch for evidence of unusually high radioactive materials. The last method has already been put into operation.

The committee which has developed the plan is the advisory committee on Radioactive Mineral Exploration and is jointly sponsored by three scientific associations. Chairman of the committee is Dr. Frederick H. Lahee, Sun Oil Company, Dallas, Texas; and vice-chairman is Henry C. Cortes, Magnolia Petroleum Company, Dallas, Texas.



Yuma Metals, Inc. has signed a DMEA contract which completes a \$75,000 diamond drilling program of 6,000 feet from the 500-foot level of the Red Cloud mine in Yuma County, Arizona, according to Luke Walker, secretary and treasurer of the firm. Mr. Walker also reports that the company will do 1,650 feet of drifting, 8,000 feet of surface diamond drilling, and will install a 100-ton pilot flotation mill. Work started January 15th and is to be completed within 15 months. The Red Cloud has been idle since 1890; yet, after 60 years, the workings were found to be in perfect condition since there never had been any timbering. The mine also has the only water in the Silver district, says Mr. Walker. Yuma Metals also owns the Dices, Riho, New North Geronimo, New South Geronimo, and New Hamburg mines. D. L. McDaniel is president, and Otto Motejl is vice president and chairman of the board. Lloyd C. White is general manager.

Ore production from the open pit mine of Castle Dome Copper Company, Miami, Arizona, is being maintained at approximately 310,000 tons monthly. Mining operations are on a three-shift basis and require a mine crew of 100

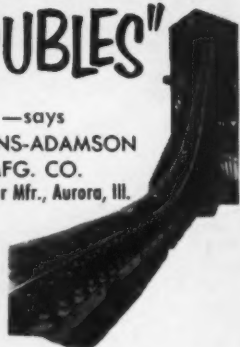


CALIFORNIA'S LARGEST CHROME MINE

The Cyclone Gap chrome mine in Siskiyou County, California, has produced 2,500 tons for the government stockpile at Grants Pass, Oregon, within the short season of four months. The Cyclone Gap is an underground mine reached by a 350-foot haulage tunnel. Ore is mined from a stope which at present is 70 feet high. The entrance to the mine may be seen at the right in the picture above. The ore bin is to the left. In the center is the compressor shed with a 365-cubic-foot portable compressor, and framed timber may be seen stockpiled on dumps ready to be taken into the mine. William S. Robertson is operator of the property.

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men. Ore is milled in the company's 10,000-ton-per-day concentrator. John Grey is mine superintendent.

Steady progress is being made by Copper Cities Mining Company, Miami, Arizona, in preparing its open-pit mine for production. A crew of 84 men is employed on a three-shift basis and waste rock is being removed at the rate of 800,000 tons monthly. The property is expected to be producing at an annual rate of 45,000,000 pounds of copper by 1954. Its production will replace that from the Castle Dome Copper Company when that ore body is depleted. Both companies are subsidiaries of Miami Copper Company. R. W. Hughes is general manager.

An inclined shaft is being sunk by the Black Queen Mines at its property 12 miles south of Aguila, Arizona. The operators expect to be in position to ship about 50 tons of manganese ore daily within the next 60 days. Fred Seifert, Aguila, is in charge of the work.

The Mineral Mountain Mining and Milling Company is continuing development work despite the recent slump in the lead and zinc prices. The property is located seven miles southeast of Superior, Arizona. Considerable preliminary work has been accomplished during the past six months, such as road work, leveling off a mill site, widening drifts for about 50 feet, installing track, etc. In addition, two trial shipments of ore of about eight tons each have been made, and a carload of ore is now ready for shipment. Present plans call for a dry concentrating plant manufactured by Sutton, Steele and Sutton, as preliminary tests indicate a possibility of 91 percent recovery by dry concentration. A crew of four men is employed. President of Mineral Mountain Mining and Milling Company is O. L. Dawson of Los Angeles, California. A. J. Henry is manager.

V. W. Winters, former mill superintendent for Eagle Picher Company's Sahuarita, Arizona, flotation mill, is in charge of construction at the sampling plant being erected by General Services Administration for the Wenden (Arizona) manganese purchase depot.

The Allison mine, near Sells, Arizona, is producing about 300 tons of siliceous gold-silver ore monthly from its claims in the Fresnal district of Pima County. The ore goes to the Ajo smelter of Phelps Dodge Corporation for use as smelter flux. The Allison is owned by Tom Reed Gold Mines Company and leased to Odin B. Dodd of Tucson and Maurice Hedderman of Sells, Arizona. The latter is in charge of mining operations. Present work is on a new vein several hundred feet from the old Allison workings and consists of open-cut stoping and driving a crosscut tunnel. Eight men are employed.



The Kaiser Steel Corporation is building the first HMS plant in California to beneficiate iron ore at its Eagle Mountain mine in Riverside County. The 400-ton-per-hour plant will operate two shifts per day five days a week separating hematite ore from gangue. Separation of the plus- $\frac{1}{4}$ -inch minus-1-inch feed will be done

in a 10- by 10-foot Wemco ball mill using a ferrosilicon medium.

The El Dorado Chrome Company is reportedly strip mining on property about six miles south of Latrobe, California. The company has leased the mill of the old Church mine, and expects to treat 200 tons of ore to the mill every day. Eventual shipping will be about 40 tons of concentrates daily.

The Kate Hardy gold mine in the Alhambra district of California has been closed down for the winter by the lessees Phil, Hugh, and John O'Donnell.

Leo Dressler and associates, operating the Holiday chrome mine in the Pattee Creek district near Crescent City, California, reportedly are shipping mine ore assaying 59 percent chromic oxide. Last year the group shipped 45 percent chromic oxide ore to the government's stockpile at Grants Pass, Oregon. Present operations are on the same property but on a different deposit.



At the White Caps mine near Tonopah, Nevada, an orebody 20 feet wide is under development on the 300-foot level of the shaft which has been pumped out and repaired. New operators Mark Young of Tonopah, and A. C. Conlee and associates of Portland, Oregon, plan development of the antimony deposit on the 300, 400, and 500 levels with deeper development planned after the mine is in production. The old Manhattan Consolidated gold mill is being reconditioned in preparation for milling of 100 tons of antimony ore daily.

The Lakeview Tungsten Company is said to be milling about 50 tons of

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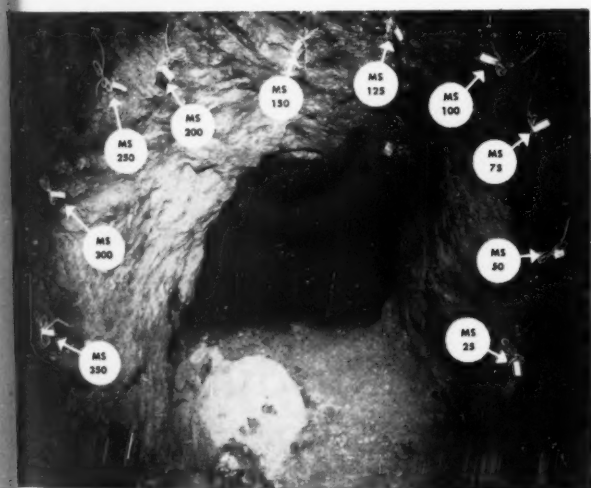
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Miner (at left) makes up primer with "MS" Cap for typical shot in a sub-level stope of midwestern iron ore mine. In this case, the blast consisted of 10 holes in a vertical ring parallel to the stope face and having a horizontal burden of eight feet. Hole depths ranged from 20 to 25 feet.

The shot contained a total of 300 pounds of "Gelox" No. 2, 2" x 16", a cohesive semi-gelatin which has proved very popular for mining iron ore. The holes were primed full depth with Primacord and were initiated with Du Pont "MS" Delay Electric Blasting Caps arranged as indicated in the lower photo. This midwestern mine has consistently reported (1) better breakage, (2) substantially reduced concussion, and (3) improved safety resulting mainly from less unexploded dynamite in the muck pile.

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pelite daily from its mine near Humboldt, Nevada. The plant is operated by Diesel-electric power, and is equipped with a jaw crusher, set of rolls, and five gravity concentration tables. Mining is from a 300-foot tunnel. The property is leased from L. H. Martin by a California group headed by Robert E. Zumwalt of Fresno, California.

The Argenta Mining Company reportedly is operating the old gold and silver mining property of Candelaria, near Tonopah, Nevada. Six men are employed in cleaning out the 800-foot shaft and old workings. Mine equipment includes a gallows frame, a 60 kw. Diesel-electric power plant, and an electric hoist and compressor. A 100-ton mill is located about 10 miles from Candelaria. Mine manager is Carl Earl, and Gene Gates is in charge of mill operations.

NEW MEXICO

Full operation has started at the Conqueror mine of the New Mexico Copper Corporation near Carrizozo in the Corona mining area of New Mexico. Present workings consist of a 135-foot shaft with two compartments. Drafting will be started in three directions on the 135 level, while open-cut work will be carried on on a five-foot ledge exposed 100 feet east of the shaft. Copper, silver and lead shipments are expected to start soon to the American Smelting and Refining Company's smelter in El Paso, Texas. Fluorspar shipments are also expected to be made to the mill at Deming, New Mexico. The company also expects to start a development and shipments from the Surprise mine in the Nogal district by March 1.

International Minerals & Chemical Corporation is planning a substantial addition to its sulphate of potash facilities near Carlsbad, New Mexico. The site has been laid out and construction is expected to start within a few months. Production should begin in 1954 according to the present schedule. The expansion will add about 35,000 tons of sulphate of potash a year. Improvements are also being made at the potash plant where the company is spending \$235,000 in enlarging hoisting capacity. These improvements are expected to increase output by 15 percent. Another enlargement in the refined potassium chloride plant costing about \$285,000 will increase capacity about 50 percent.

Karl Strand, lessee of the New Jersey Zinc Company's property at Kingston, New Mexico, is shipping high-grade manganese ore which assays up to 48 percent Mn from Kingston to the U.S. government's ore purchasing depot at Deming, New Mexico. All of his shipments to date have settled at over 43 percent Mn.

Frank S. Hall of Corona, Lincoln County, New Mexico, has developed an open-pit iron ore mine and is shipping 75 tons of high-grade ore per day to the Minnequa steel plant of the Colorado Fuel & Iron Corporation at Pueblo, Colorado. The ore is mined from a vertically walled deposit about 30 feet wide, and trucked 24.6 miles to a railroad shipping point. Shipments have averaged from 60 to 63 percent iron.

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Bradley Co. May Reopen Idaho Antimony Smelter

The Bradley Mining Company tentatively plans to reopen its antimony smelter at Stibnite, Idaho, this spring, depending upon antimony market conditions and the future outlook at that time. The \$2,500,000 smelter was closed down last summer along with the Yellow Pine antimony mine and mill when increased exports forced prices down to a point below the company's break-even operating level.

The smelter is the only one in the United States able to handle mixed ores. It produces both antimony metal and a premium-grade antimony oxide. Former production was between 4,000 and 5,000 tons of contained antimony annually; smelting in the spring would be at about 75 percent of this rate if started up again. First to be processed would be stockpiled concentrates and secondary products from previous operations, including slag, dross (a residue of the refining process), and furnace brick. On this limited basis, about 50 men would be employed. Later in the year, if market conditions so dictate, the firm will consider purchasing of foreign ores for the smelter.

Harvey To Build Aluminum Facilities in Oregon

The Harvey Machine Company of Torrance, California will spend approximately \$55,000,000 on its newly approved aluminum reduction plant to be constructed at The Dalles, Oregon, and another \$7,000,000 on bauxite mining in French, British, and Dutch Guiana.

The Defense Production Administration has approved construction of the reduction facilities which will provide 54,000 short tons of aluminum per year. A certificate of necessity has been granted which permits the company to write off 75 percent of the cost over a five-year period.

Harvey reportedly has made arrangements with the Bonneville Power Administration for 120,000 kw. of firm and interruptible electric power beginning July 1, 1954. The company does not expect to start production of aluminum until late in 1954. The entire project will be financed by private capital. A pilot plant is also planned, probably at Salem, Oregon, for the treatment of Columbia Basin bauxitic clays.

smelter of The Consolidated Mining and Smelting Company of Canada, Ltd. was unable to handle their production because of a hydroelectric power shortage. Shipments of the trio—Canadian Exploration, Ltd., Reeves MacDonald Mines, Ltd., and Giant Mascot Mines Ltd.—initially were at the rate of about 1,750 tons total monthly. Thirty customs shippers are supplying about 6,000 of the 10,000 to 12,000 tons of lead concentrates handled by the Kellogg plant monthly, the remainder being Bunker Hill production. Smelter output is 5,000 to 5,500 tons of refined lead monthly. Paul C. Feddersen is smelter superintendent.

Sunshine Mining Company's No. 5 winze is nearing the 4,000-foot level, which will be 1,300 feet below sea level. The famed Sunshine silver vein will be developed from new 3850 and 4000 levels. It has been developed to the 3700 level. Exploratory crosscuts to the Yankee Girl vein on the 3100 and 3400 levels are well underway. The 3400 drive recently cut a narrow seam of high-grade silver ore believed to be the downward extension of the No. 6 Sunshine vein which yielded a substantial tonnage of ore above the 3100 level.

Installation of a new 800-horsepower hoist is underway at the *Silver Summit Mining Company's* operation in Shoshone County, Idaho. To provide a minimum of interference with production, the hoist is being installed on the opposite side of the main shaft from the hoist now in use.

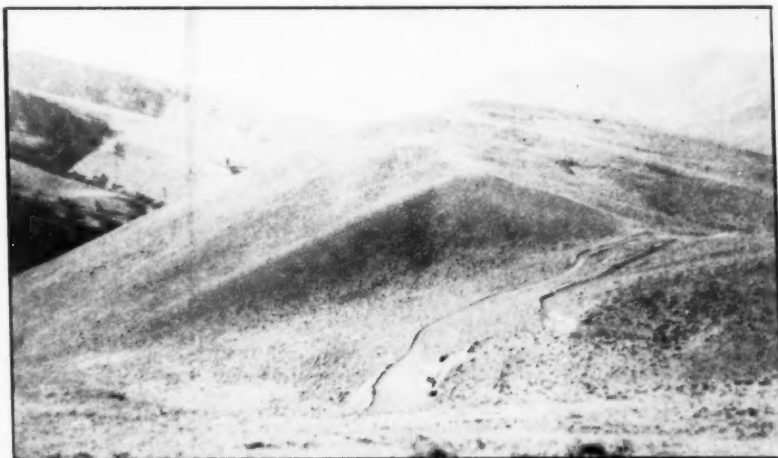
Deepening of the *Highland-Surprise Consolidated Mining Company's* inclined

shaft in the Pine Creek district of the Coeur d'Alene mining region, Idaho, is nearing completion. Sinking from the 1450 level to the 1,900-foot point was a major phase of a \$200,000 DMEA lead-zinc exploration project. Another phase, an 1,800-foot drift on the 130 level, is also nearing completion.

Shaft sinking at the *Conjecture* lead-zinc-silver mine in the Lakeview area of the Pend Oreille mining district, Bonner County, Idaho has been completed under a DMEA project, and drifting is underway toward the projected downward extension of ore shoots mined in upper workings by former operators. The shaft had been deepened 200 feet to the 400-foot point. The property is owned by Donald Majer and Lyle Funnell of Spokane.

Deep development of *Chester Mining Company* ground in the silver belt of the Coeur d'Alene mining region, Shoshone County, Idaho, is called for under an agreement ratified with *Polaris Mining Company*. *Polaris*, controlled by *Hecla Mining Company*, will extend its Good Hope lateral westerly from the 3000 level of the *Silver Summit* mine to explore 1,500 feet of the Chester vein outcropping in Chester ground. Previous work in Chester was from the 1000 and 2300 levels of the *Polaris* mine. *Polaris* owns 55½ percent of outstanding Chester shares. L. J. Randall, Wallace, is president of Chester, *Polaris* and *Hecla*.

An underground stream of water flowing 3,000 gallons per minute halted operations at the *Triumph* mine near Hailey in south central Idaho. The water broke into the mine at the 1000-foot level, about 100 feet below the Wood river

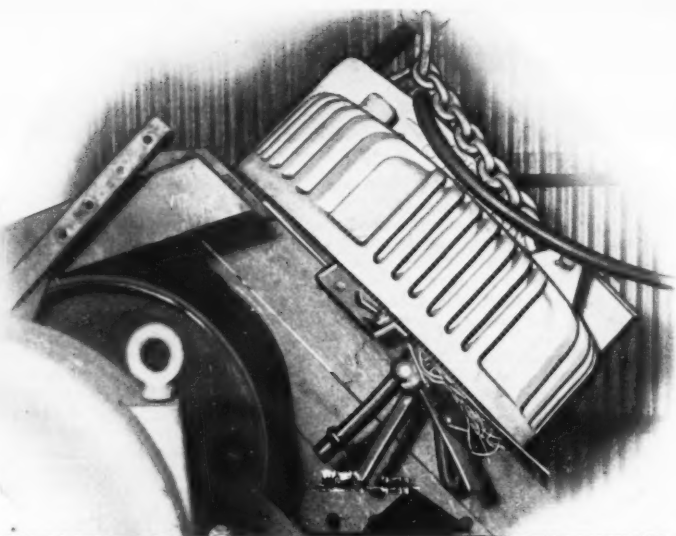


RADIOACTIVE MINERALS IN OLD MINE

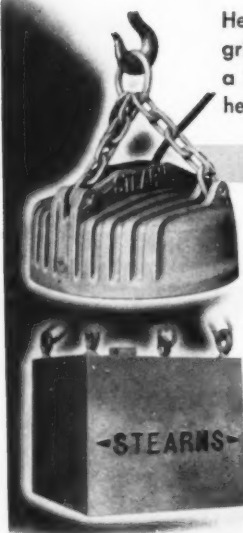
The old Buffalo mine, 32 southeast of Salmon in Lemhi County, Idaho, is being reopened by Irvin C. Porter and G. Elmo Shoup of Salmon, and G. W. Burkman of Idaho Falls, under a lease and bond from George Shoup and Earl Pyatt. The mine adit was found to be in good condition. It had been driven 88 feet, 6¼ feet high and on the average of 4 feet wide. Two radioactive mineral-bearing veins had been cut by the crosscut but the radioactive minerals were not recognized by early operators. One vein is 4.75 feet wide, and the other is 2.50 feet wide. Exploration of both veins is continuing. The mine (center foreground) is located above Agency Creek in the hills which form the western slope of the Montana-Idaho divide.



The Bunker Hill and Sullivan Mining and Concentrating Company's lead smelter at Kellogg, Idaho contracted to buy lead concentrates from three British Columbian firms when the Trail, B.C.



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valley floor. Two large pumps were lowered into the mine on cables. Lewis Robinson is mine manager, and A. H. Shaw is general manager of Triunfo Mining Company.

Underground exploration for thorium and uranium at the Wonder claims in Lemhi County, Idaho is planned for this spring by Defense Metals, Inc., of Kellogg. The vein will be drifted on at 100-foot vertical levels. Ten of 13 deep bulldozer trenches, cut this year under a \$68,265 DMEA project, exposed radioactive mineralization. Robert H. Svensen, mining engineer, is in charge.

The Whitdelf mine shaft near Clark Fork, Idaho was down past the 700-foot point at last report. Deepening of the incline shaft from the 450-foot mark to the 800-foot level was started last summer with aid of a DMEA loan to Whitdelf Mining & Development Company. Compton I. White Jr. is manager.

Snow forced a winter shutdown at Lone Mining Company's Summit mine district property east of Murray, Idaho after 70 tons of high-grade lead ore from a new ore discovery had been broken into a chute. Otto M. Nordquist is president and manager.

New Era Mines, with holdings in the Pine Creek district of Shoshone County, Idaho, has announced plans to explore ground at depth by means of a 3,000-foot crosscut from the 1200 level of the adjoining Sunset Minerals Inc.'s shaft.

A new charge preparation plant at the Bunker Hill and Sullivan Mining and Concentrating Company's lead smelter near Kellogg, Idaho, is scheduled to go into operation next May or June, according to Paul C. Feddersen, superintendent. Machinery will be installed this winter. A new pelletizing plant will be finished about next November. With a new crushing and grinding plant completed last June, the modernization program will cost about \$2,500,000.

Polaris Mining Company is developing a new oreshoot opened in the western part of its Silver Summit mine near Oxburn, Idaho. The ore was found by diamond drilling into the footwall of a siderite structure being followed into adjoining Purim ground, according to L. J. Randall, president. The new vein, lying 70 feet north of the siderite vein, averaged about four feet wide of good commercial silver-copper ore where first opened.

A 75 percent DMEA loan has been granted McRae Tungsten Corporation of Yellowpine, Idaho, for tungsten exploration at the Red Bluff claims in Valley County's Big Creek mining district. The total cost will be \$53,800. It will include surface diamond drilling and tunneling. The new work will be near the Snowbird group on which the company recently completed a \$20,351 DMEA tungsten project.

Lucky-Custer Mining Corporation of Boise, Idaho, has been incorporated for \$100,000 by Peter Scherer and W. H. Hayes of Boise, and E. L. Revis of Caldwell.

The Index-Daley Mines Company has been incorporated at Boise, Idaho, by Charles S. Woodward, R. W. Edmunds and Glen A. Finlayson, all of Salt Lake City. Capitalization is \$500,000.

Signal Mining Company plans to deepen the shaft at the old Hilarity mine on Pine Creek in the Coeur d'Alenes of Idaho, and carry on crosscutting, drifting, and raising at lower horizons under a \$157,300 DMEA lead-zinc exploration

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contract. Gene Iverson will be engineer in charge; Frank A. Taft, consulting engineer; Robert Svendsen, consulting geologist. Harry G. Alway, Osburn, Idaho, is company president.

In a new exploration project from its 2,800-level workings in the silver belt between Wallace and Kellogg, Idaho, *Coeur d'Alene Mines Corporation* is tunneling southeasterly in a wide shear zone toward adjoining *Rainbow* ground, which it controls.

Blue Sky Mining Company, a partnership of Dee Chapen of Wallace, Idaho, and Al Peters and Howard Crews of Spokane, Washington, has started a tunneling project in the Dobson Pass area of the Coeur d'Alene mining region in Idaho to get depth on a promising lead showing.

Sun Valley Lead Silver Mines' new lower tunnel at its *Blue Kitten* property in Blaine county has opened better grade ore than found above, reports Ross L. Roundy, president and manager. At last report, ore was said to be showing in the face and on both sides of the drift, with full width undetermined. It was planned to stockpile production this winter for milling next spring.

Bullion Mining Co., Ltd., with holdings southeast of Mullan, near the Idaho-Montana border, has dropped the Limited from its name, made its corporate existence perpetual, and reduced its capitalization from \$1,500,000 to \$150,000 by lowering par value of its 1,500,000 authorized shares from \$1 to 10 cents each.

Gem Monazite Mines, Inc. is test-hole drilling a 1,000-acre property in Valley County's Cascade area, Idaho, with a view to starting dredging operations next

spring. Raymond Briggs and Associates are doing the engineering.

Idaho Goldfields, Inc. of Spokane has contracted with Howard H. Hunt of Pinehurst, Idaho, for diamond drilling at its Fourth of July Canyon property east of Lake Coeur d'Alene, Idaho.

Sunshine Mining Company recently announced plans to drive a 1,200-foot diamond drill hole beyond the face of the long southerly crosscut it had driven through adjoining *Metropolitan Mines Corporation* ground at the 3,100-foot level. However, no diamond drilling, new development, or exploration work will be undertaken while the Defense Electric Power Administration Order EO-4 limiting electrical energy use in the Pacific Northwest remains in effect.

Vivian Bros., a partnership, has recently been incorporated as *Vivian Bros., Inc.* It is a diamond drilling contracting business in Kellogg, Idaho, and will continue as such. The firm was first formed in 1944. Its officers are H. H. Vivian, president; C. B. Vivian, vice president; E. M. Vivian, secretary; and E. L. Vivian, treasurer.

Sidney Mining Company has started crosscutting toward an unexplored section of its property in the Pine Creek district of the Coeur d'Alenes, Idaho. The work is being done northerly from the No. 5 level of the *Sidney* mine, following completion of a geophysical examination of the area in the first phase of a \$200,000 DMEA zinc-lead project.

Idaho Beryllium and Mica Corporation of Deary, Idaho, has started exploring a pegmatite dike for mica and beryl under a \$28,700 DMEA contract. The work is at the old *Muscovite* mine in

Latah County, where the firm is producing sheet mica. The government agency will loan the firm 90 percent of the cost



A \$17,500 lead exploration project, the *Faithful* mine in the Vipond mining district of Beaverhead County, Montana, has been approved by the DMEA. Mr. Roberta Wegener of Basin, Montana, is the recipient. Plans call for shaft deepening, drifting, and crosscutting.

The Sepey Creek mining district, Sanders County, Montana, will see \$10,800 spent in copper exploration under a DMEA contract with Elmer and Jessie M. Allen of Midvale, Utah.

Eugene Keesey of Wallace, Idaho, has reopened and reequipped the old *Slope Creek* gold mine, 15 miles northeast of Superior, Montana, in preparation for a new exploration program next spring. The mine, discovered in 1904, yielded gold a short distance below the outcrop and rich gold-silver-lead ore at a 10-foot depth. A long lower tunnel was started in 1939 after construction of a five-mile access road. Work was stopped in 1942 when the WPB halted gold mining. Keesey plans to extend the lower tunnel about 200 feet to prospect the body at greater depth.

The Defense Production Administration has granted a certificate for ac-

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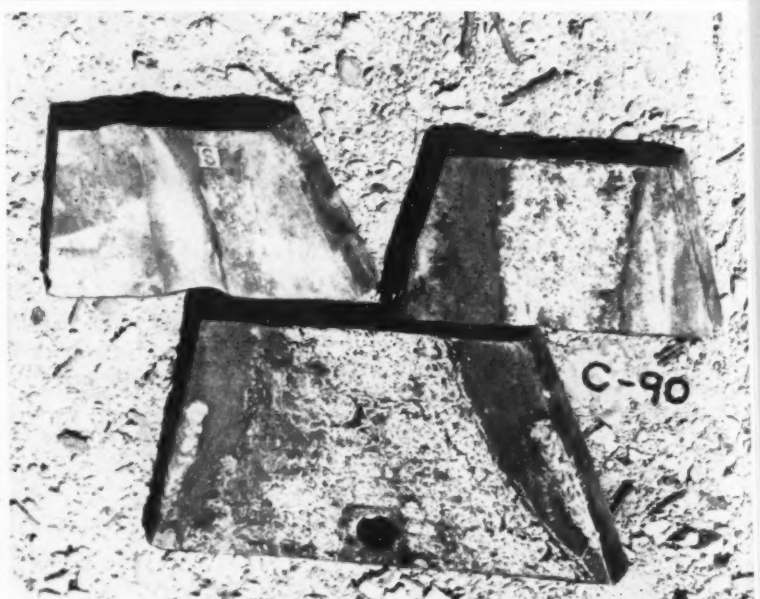
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ated an amortization to the *Anaconda Copper Mining Company* of Anaconda, Montana for 70 percent of \$1,428,800 worth of sulphuric acid plant facilities.

Recently incorporated at Helena, Montana was the *New Lenmore Mining Company*, with capital stock of \$100,000, by G. E. Minty, Jack Sheldon and Frank E. Hobson, all of Missoula.

Albert F. Carlson of Basin, Montana, with U.S. Bureau of Mines' aid, has opened a promising lead, zinc and manganese ore body at the North Boulder prospect in the Alta Gulch area of the Basin mining district. Surface trenching and tunneling at a depth of 38 feet have indicated a mineralized structure 2,800 feet long and 600 feet wide at the shaft, according to bureau officials. An area 100 feet long and 60 feet wide, completely stripped, is all in vein material. Carlson's find is at a long-abandoned gold-silver property which he acquired in 1946. The group now consists of four patented and 27 unpatented mining claims.

Sunlight Mining Company of Spokane has been granted a 20-year lease on 617 acres of government-owned phosphate land in the Boulder mining district near Maxville, Montana. The Bureau of Land Management accepted the firm's bid of \$8,235 for the lease. Part of the leased land is covered by the company's 49 unpatented mining claims, formerly the *Moonlight* silver-lead-copper property. Considerable phosphate has been uncovered and production will start next spring, according to E. E. Crawford of Spokane, president. William Lucht Jr., Spokane attorney, is secretary-treasurer and counsel for the firm.

A north drift on the Puck vein from the main adit of the *Lexington* mine near Nehart, Montana, has uncovered a base metal milling ore. James A. Allen of Spokane is president of *Lexington Silver-Lead Mines*.

Missouri Uranium Mines, Inc. of Townsend, Broadwater County, Montana, has filed articles of incorporation at Helena. Frank P. Nash, M. E. Toney, and D. J. McKillican, all of Townsend, are directors.

Western Mines Company of Helmsville, Montana, plans to start work in the spring on a \$21,600 tungsten exploration project in Powell County with aid of a \$16,200 DMEA loan.

Articles of incorporation have been filed at Helena, Montana, for the *Tungsten Minerals, Inc.* of Dillon. Directors are Allen Pierce, R. F. Fleming, and Catherine Groshean, all of Dillon. Capitalization is for \$100,000. *Letus Mining Company* has also been incorporated. Organizers are Gene F. Mina, and John A. and Betty Marker, all of Philipsburg; capitalization is for \$50,000.

OREGON

Johns-Manville Company, Ltd. of Canada has temporarily halted its exploration of a serpentine asbestos deposit in eastern Grant County, Oregon.

The *Bonanza* quicksilver mine in Douglas County, Oregon, which resumed production last April, has been produc-

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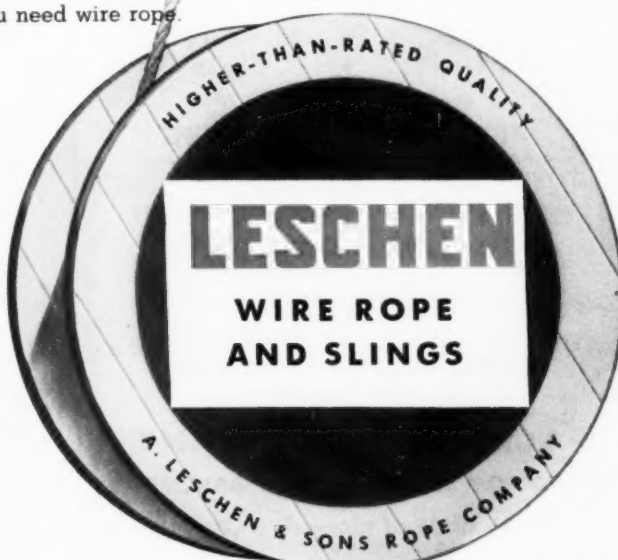
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ing about 100 flasks of quicksilver monthly. Operations are continuing on the basis of two mine shifts and three mill shifts daily.

Tri-County Mining and Concentrating Corporation of John Day, Oregon, has shipped 100 tons of chromite concentrates to the federal government's purchasing depot at Grants Pass. This production came from 60 tons of chromite ore mined from the leased **Dry Camp** mine. E. R. Wells of Mount Vernon, Oregon, is company president; and J. A. Curzon, general manager.

A new U.S. Bureau of Mines' publication describes high-temperature experiments with zirconium at its Northwest Electrodevelopment Laboratory in Albany, Oregon. The report tells of tests made in connection with the laboratory's recent development of an economical method of producing ductile zirconium.

The Defense Production Authority has granted **Hanna Coal and Ore Corporation** a certificate of necessity for accelerated tax amortization in the amount of \$22,000,000 for ferro-nickel production facilities in Douglas County, Oregon.

Manganese ore assaying 54.45 percent manganese is reportedly being mined by Fred Ranes and Henry Spivey near Whitney, Baker County, Oregon. The ore is presently being stockpiled preparatory to shipment to the **Ray-O-Vac Company's** plant in Salem, Oregon, for manufacture into manganese oxide used in dry batteries.

A silicon manganese alloy metal has been made from rhodonite in electro-smelting experiments at the Bureau of Mines' electrometallurgical laboratory at Albany, Oregon, according to S. M. Shelton, director. The alloy has been sent to steel producers for testing. The rhodonite used came from southwestern Oregon and had a 23 percent manganese content. The Albany experiments are to be continued with bementite from Washington's Olympic peninsula and silicate manganese from the Butte, Montana district.

\$22,200 in shaft sinking and drifting on unpatented lode mining claims in King County, Washington. The property is located on the west slope of the Cascades near North Bend, Washington, and is easily accessible with a road to the mill and portal. A complete 50-ton per day ball mill and concentration (flotation) plant was built last year. Test runs showed good results. The ore is a chalcocite with gold and silver values. One load of concentrate was shipped to the ASARCO Copper smelter in Tacoma last fall. Charles Sisenvine is president of the firm.

Honce Sound Company has reduced output of its **Holden** mine in Chelan County, Washington, from 2,000 tons to about 1,500 tons a day to comply with the 10 percent power cutback order in the Northwest. John J. Curzon is manager.

Northwest Magnesite Company and residents of the Chewelah area of Stevens County, Washington won a fight to retain existing freight rates on magnesite shipped to eastern markets. The Interstate Commerce Commission recently denied a petition of eastern railroads for a rehearing on a petition for an increase in the freight rates.

A record 140,000 tons of silica was produced by **Pacific Silica Company** from its Denison, Washington, quarry in 1952. Plants using silica from the quarry included **Pacific Northwest Alloys** and **Spokane-Portland Cement Company** of Spokane; **Keokuk Electrometallurgical** plant of Rock Island; **Electro-Met** and **Ohio-Ferro Alloys** of Portland; and **Northwest Portland Cement** of Grotto, Washington. Cecil Mullenix of Deer Park is superintendent of the Denison operations.

To meet the 10 percent electrical energy cut ordered by the DEPA for large power users in the Northwest, **Knob Hill Mines, Inc.** has substituted Diesel power to run air compressors and reduced its mill operation to five days a week. Washington's leading silver producer and only operating mine in the famed old Republic district of Ferry County is continuing production at about 200 tons daily. A new 8th level is being opened 1,200 feet down a 65-degree incline shaft. Roof bolting has been substituted for timbering following six months' experimentation, and a recently inaugurated sand filling system for stopes is proving satisfactory. A. R. Patterson is general superintendent and James Davis, mine superintendent.

To meet growing demand from west coast industries for silica sand, **Spring-**

dale Silica Sand Company will triple capacity of its recently completed \$80,000 processing plant at Springdale, Washington, according to J. W. Melrose of Spokane, vice president. Four new conveyors, three new sizing screens, and a new 58-foot dryer have been ordered to boost capacity to 60 tons an hour. Sandstone, said to be 99 percent pure silica, is mined by open-pit methods at Lyon's Hill, eight miles west of Springdale in Stevens County, and trucked to the plant.

Beryl has been uncovered on leased school land in the Drummond Creek district 21 miles northeast of Chewelah, Washington, according to Dr. S. P. McPherson, one of the lessees. The discovery was made by bulldozer. Mining is scheduled to start next spring.

The old **Copper King** mine on Eagle Mountain, near Chewelah in Stevens County, Washington, is being reopened by **Chewelah Copper Company**, which also is rehabilitating the adjoining **United Copper** mine. A dragline was used to remove caved overburden and old timbers over the first 100 feet of the 1,000-foot adit. W. B. Moorhead of Chewelah is mine foreman.

Bulldozing has opened three lead-silver-copper veins at the **Galena Farm** property in the Northport mining district of Stevens County, Washington, according to E. J. Mullen of Chewelah. Values are in lead carbonates. Additional exploration work is planned for next spring. The claims are owned by Mullen and Clarence Culler, also of Chewelah.

Mine-to-market roads are being sought by two mining operations in Okanogan County, Washington. **Silver Mountain Mining Company** has asked the state mine-to-market commission to build a 1½-mile access road to its gold-silver-lead-zinc-copper property southwest of Tonasket. **Laucks Chemical Company** seeks an all-weather road to its open-pit operation near Whitestone Lake, currently yielding about 30 tons of agricultural gypsum daily.

The 75-ton **Talisman** flotation mill near Laurier, Washington, is now in operation on silver-lead-copper-zinc ore opened in the old **Talisman Mining and Leasing Company** mine, according to Henry T. Born, head of **Spokane Mining Syndicate, Inc.** The Spokane company is developing the property under a joint contract with the Defense Minerals Exploration Administration which totals \$44,000.



Western States Copper Corporation of Seattle has signed a DMEA copper exploration contract for expenditure of



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Turret and Whitehorn

(Continued from page 46)

and Milling Company, the Gold Bug, Knight Templar, Anaconda, Japan, Vivandiere, Queen City, Golden Wonder worked by the Turret City Mining Company of Chicago, and with 400 to 500 men in camp, all engaged in prospecting or developing their claims, mining experts predicted that the Turret district would be one of the richest in the state.

The finding of free gold in the Turret City mine and of a nugget weighing two ounces in another property all helped boost Turret's stock. In 1902, when it was rumored that unlimited capital was about to be invested in all the principal mines at once and when several new companies arrived and began operations, a local merchant announced that he was selling more powder than at any time in the history of the camp.

Few of the 75 to 100 buildings which comprised the town have survived, and in 1942 when I last saw Turret only one family was still there.

Turret is a metropolis today compared to Whitehorn. To reach this once active camp, follow the other (or eastern) fork from the meadow five miles below Turret, up a ledge road, past a small quarry, and through aspen groves across a mountain top to the foot of a hill where, in a grassy mountain park at the eastern base of Cameron Mountain, stands one old building and several new cabins. The grassy park is the site of Whitehorn.

In 1896 cattle ranged over Cameron Mountain and tie-choppers cut timber. The following year one of the choppers, Derius Patro, found some float on the mountain and had it assayed. His discovery led to the staking of the Independence, Cameron, Golden Eagle, and other properties by prospectors, and to the laying out of a little camp in June 1897. It was called Whitehorn in honor of Arthur L. Whitehorn, an assayer and civil engineer who was always ready to grubstake a prospector, to assay his float or to survey his claim, and take a chance on being paid. Early in 1898 hordes of prospectors swarmed over the area, a few panning gold but most of them engaged in lode mining.

The following year promoters reached the area. "Whitehorn is the Coming Gold Camp of Colorado." "Whitehorn Mining District is Going to be a World Beater" read banner headlines. Others were "The Mollie Gibson claim gives returns of \$30,000 to the ton and the shaft is down

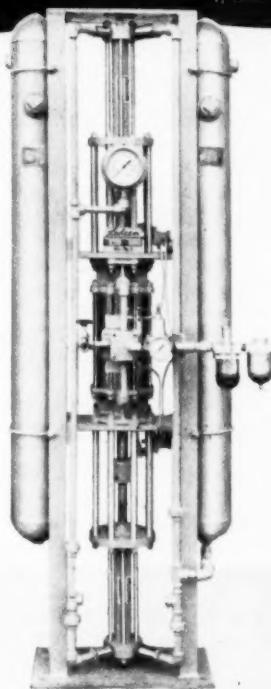
only 13 feet. This claim produced free gold that created excitement in Whitehorn a few weeks ago. Beads of gold $\frac{1}{8}$ of an inch thick showed plentifully in a piece of quartz the size of a walnut." "This district was never prospected until two years ago. Today 3,000 persons are prospecting in it." "Whitehorn City has a population of 800. Town lots meet with ready sale, some selling as high as \$500. The camp has one mill which can handle 30 tons per day. A large smelter is being erected at Salida and when it is completed Messrs Covey and Kennedy predict that within a short time Whitehorn will be known as the greatest gold camp on earth." "Iron is a prominent factor in Whitehorn ores. The total charge including hauling and freight on average Whitehorn ore is under \$10 per ton."

The Cleopatra was the best developed claim on Gold Hill. The Little Rose on Bray's Hill, where a 10-foot vein of hard quartz, assaying \$105 in gold to the ton, extended into the townsite. Other properties within the town limits were the Chet, Cleora, Little Johnnie, Nellie K., Nancy Hanks, Orton, Valley View, and Chance. Nearby mines included the Easter Day, Silver Glance, Excelsior, Gilt Edge, and O.K. group.

Fire almost wiped Whitehorn out of existence in 1902 since there was no fire-fighting equipment other than a bucket brigade which was hastily formed by the miners. From the ashes arose a new town with a "cafe and one or more saloons, a schoolhouse, a livery barn, meat market, store, two brothels and several dozen frame residences." By 1904 the Last Chance mine at Suckerville, one mile from Whitehorn, produced pockets of lead sulphide ores, and the Bruce mine netted \$43 in gold and silver to the ton. In 1905 Whitehorn's population was 600 and a stage line operated between it and Salida carrying passengers, freight, and mail. A postoffice was maintained until 1918, although by then mining had almost ceased and cattle were again grazing on the mountain. By 1942 most of the buildings had disappeared and the place was a true ghost town.

Then in 1946 Cecil R. Miller, head of the electrical maintenance department of the Cincinnati *Times-Star*, who had always wanted to own an old camp learned that Whitehorn was up for tax sale. He flew to Colorado and outbid the only other interested party, and obtained the 332-acre tract with its one remaining, sagging cabin for \$1,550.

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Taxation Study

(Continued from page 44)

coal mining, with heavy wage factors etc.). In the case of sulphur mining, 79.8 percent of the total federal, state and local taxes on production are levied by states, counties and municipalities. On iron ore, local charges before income taxes amount to 61.2 percent of the collectors' take. For copper, the corresponding figure is 40.9 percent; lead and zinc have 35.6 percent of their production taxes assessed by local bodies. The fact that some branches of mining may be more profitable than the extraction of other minerals is doubtless reflected in higher local levies thereon. Collectors overlook few fat cats. Ratios of taxation are given in Table No. II B.

Of the \$173,566,000 in production taxes and excises levied upon the bituminous coal industry in 1947, approximately 22 percent was collected by states and lesser political subdivisions. Differences in the rate of local taxation between minerals may be affected by the political weight of the operators, i.e., the closely knit coal industry is likely to be more influential with rate-

making bodies than the widely scattered gold mines.

Purpose Of Study

Tax increases since 1947, although not all levied "across the board" and to such degree increasing the imbalance of our jerry-built tax structure, have not appreciably altered the proportion of taxation indicated in the accompanying tables. It is felt therefore that the tables may serve state mining associations and others seeking tax relief by pointing out the areas of extreme levies.

The tax bite is more readily comprehended when compared with known expenditures. Thus the identifiable state and local taxes upon the domestic copper mining industry for 1947 amounted to \$8,179,000. From Table No. II, that sum is almost identical with the net federal corporation income tax paid of \$8,919,000; it is nearly twice the expenditure for explosives, four times the bill for chargeable machinery. Similarly, state and local taxes took \$23,750,000 from iron ore mines in that year. Local levies are conspicuously heavy in this industry, nearly reversing the federal:local 2:1 ratio (Table No. IIB). Iron ore pays in local imposts over 79 percent of its

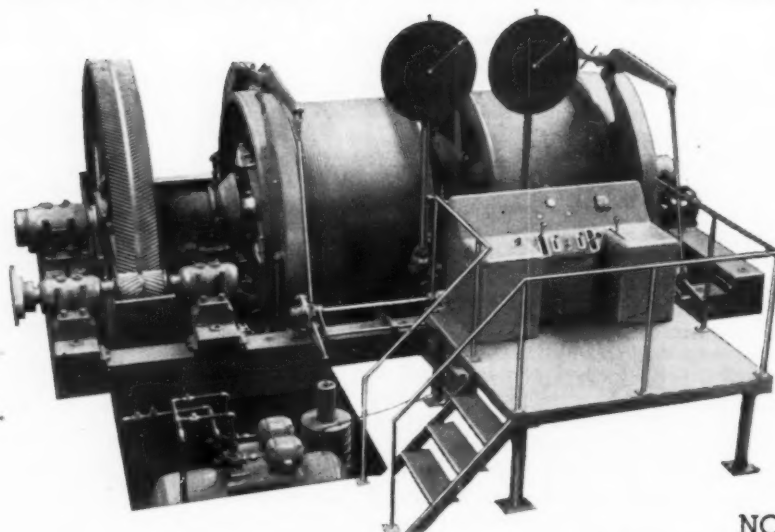
entire outlay for materials and supplies (Table No. III)! Such taxation strips off not only cushions of fat but muscle and bone as well.

The bituminous coal industry's local and state tax bill for 1947 is identified at not less than \$38,170,000, 22 percent of the total taxation shown in Table No. I. Even this relatively small proportion is equal to the total annual outlay for explosives, or nearly equal to that for machine parts and steel shapes taken together.

Taxing Inequities

Severance taxes, often levied without regard for expenditure necessary to effect severance, are largely responsible for the anomalies above and a host of others. The conception of severance taxes as seigniorage or royalty is outmoded, particularly when the coal industry is faced by inroads from oil and natural gas, and other minerals confront imports from low-wage foreign mines. Scaling down of severance rates, or preferably assessment thereof, on a "working interest" basis, giving credit for essential expenditures by the operator, would go far to right a serious inequity draining working capital from natu-

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(Continued from page 108)
ral resource industries. range
tion excises likewise penalize
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mote mines. Short of a
needed general revision of the
structure, long advocated by
tor Harry Byrd and other stu
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manifest overcharges would
the mining industry a life-s
breathing space.

Author's Views Expressed

The views expressed in this
cle are those of the author and
not presented as representing
opinion of the Bureau of Labor
statistics. The primary purpose
study of interindustry econom
the Bureau, and largely sponsore
the Defense Department, was
establishment of interindustry
tions based upon the flow of ma
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2	400	C.W.	1200	125/250	440/2300	900
2	250	Whse.	1200	125/250	2300	900
2	200	Whse.	1200	125/250	440	900
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1	150	Whse.	1200	250	2300	900
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			TYPE	MT		
1	1800	G.E.	MT 498	2300	357	
1	1200	G.E.	MT 26	2200	277	
2	1000	ALCh.	ANY	2200	235	
1	800	G.E.	MT	2200	440	
1	700	Whse.	CW	2300	720	
1	600	G.E.	MT 20	2300	360	
1	500	ALCh.	ANY	2200	514	
2	500	G.E.	1-16-M	2300	450	
1	400	G.E.	MT 412	2200	440	
1	250	Whse.	CW 937	440	1200	

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- 4 foot Telsmith gyrasphere crusher, with drive.
- #86 Marcy ball mill, with 225 hp motor.
- Dillon double drum hoist, rope pull 7000 lbs., 500 fpm with 100 hp motor.
- Used Mack 9 cu. yd. dump trucks, Model FM-1938.
- Used Mack 15 cu. yd. dump trucks, Thermodyne Bogie drive.

For Full Information

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or telephone: San Francisco, DOuglas 2-7180

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Mine Hoist: Vulcan 1-drum 36" post brake, 440 volts 75 hp.
Mine Cars: Ten 16 ft. 18" gal., swivel
Ball Mill: #64 1/2 Marcy grate discharge
Classifier: Wemco 48" spiral type
Filter: 6x6 Oliver w/vac. eq.
Thickener: Dorr 16x10 ft.
Crusher: 24x12 Allis-C.—New
Crusher: 2 ft. Symons cone
Flotation: 8 Cells 31 1/2 x 31 1/2 Sub-A

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- Ingersoll-Rand. Model 20NM2-C double drum electric slushers, with 20 HP, 220/440 volt, 3 phase, 60 cycle electric motors. 2200# R.P. @300 F.P.M.
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- New Coppus. type SP125 Vano Blowers. 385 C.F.M., through 100" of 6" vent pipe.

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- 1-4 ton Ironton battery, 36" gauge
- 2-7 ton General Electric permissible battery, 36" gauge
- 1-7 ton Atlas battery, 36" gauge
- 3-8 ton Ironton battery, 36" gauge
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- 1-5 ton Jeffrey trolley, 36" gauge
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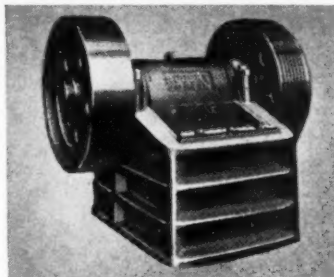
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- 1-4' Symons Cone Crusher



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- 1-8" x 36" Universal
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- 3-8-ton G. E. HM-819 with reels
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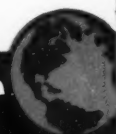
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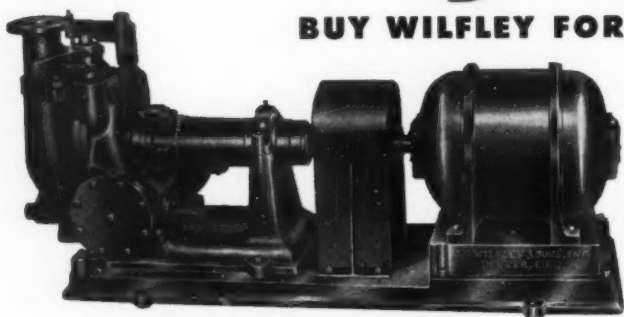


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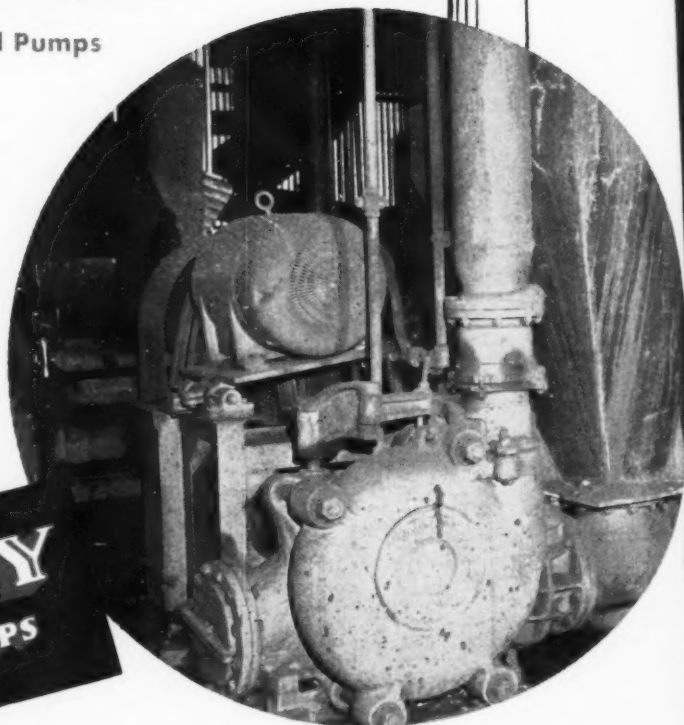
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